

THE IRON AGE

A Review of the Hardware, Iron, Machine and Metal Trades.

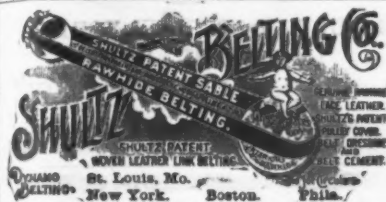
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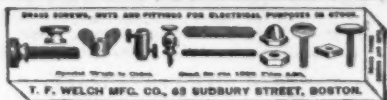
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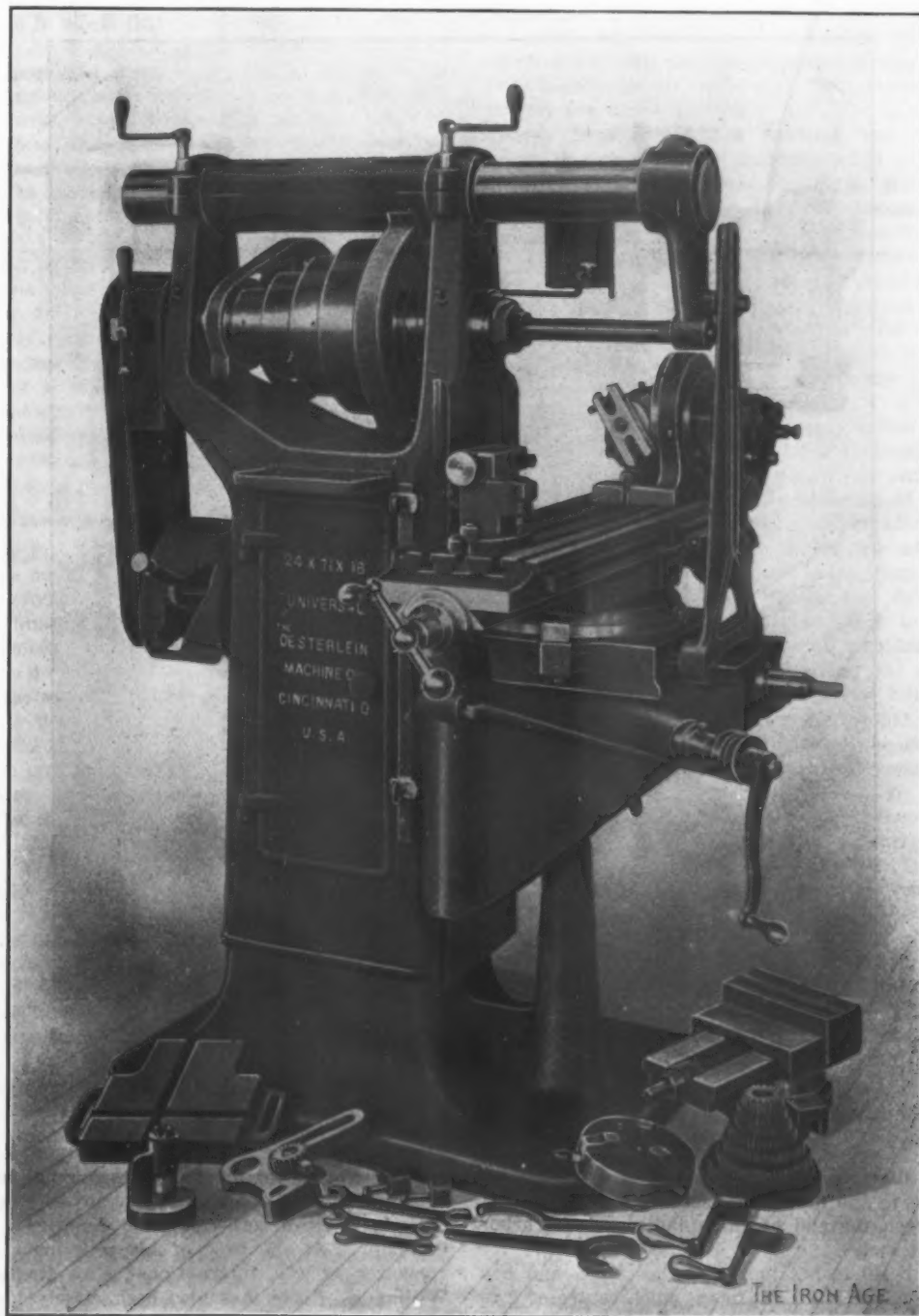
THE IRON AGE

THURSDAY, MAY 7, 1903.

The Oesterlein Universal Milling Machine.

The most important improvement in the new universal milling machine built by the Oesterlein Machine Company of Cincinnati, Ohio, is the all gear feed mechanism shown in Fig. 2. This train is composed of spur gears and does

chine was made with a cut taken with a $2\frac{1}{2}$ -inch diameter mill having a $5\frac{1}{2}$ -inch face, cutting $7\text{--}32$ inch deep in cast iron, feed 0.066 inch to one revolution of the spindle, the spindle running in back gear 22 revolutions and feeding 1.32 inches per minute; when the cut was increased the belt came off the cone.



THE OESTERLEIN UNIVERSAL MILLING MACHINE.

away entirely with the use of bevel gears, chains or worm gears. The general arrangement of this train and of the change gears will be understood from the engravings. The train transmits power from the live spindle to the change box and from thence to the feed by a splined shaft and universal joint. This entire mechanism is of such strength that the driving belt will give way before any part of the feed will break. A test of the ma-

To explain more in detail, this drive consists principally of two gear boxes, an upper one which takes the power from the spindle and transmits it to a lower one. The upper box contains a sliding gear on the spindle operated by a lever to make one change of speed. The lower box contains a cone of gears and a sliding gear by means of which the different gears may be engaged. The change is made while the machine is running by engaging

the sliding gear with any of the cone gears. An index plate giving the amount of travel for each gear is affixed to the feed box so that the operator can readily see what feed he is using. The feed changes are 0.004, 0.006, 0.008, 0.011, 0.014, 0.017, 0.020, 0.029, 0.039, 0.052, 0.066 and 0.091 inch to one revolution of the spindle.

The column is of box form, rigidly braced, and of sufficient weight to resist vibration; it has a cylindrical brace between the uprights to strengthen them. The spindle is of crucible steel with a hole its entire length. The front end is threaded to allow standard cutters to be put on, the thread being covered by a nut when not in use. The front journal is tapered and provided with a lock nut to compensate for wear. The bearings are bronze. The back gear ratio is 6.3, which will give, with the countershaft running 100 revolutions, a speed of 228, 130,

the outside flange, thereby insuring solidity. The clutch handle on the elevating screw and cross screw may be used simultaneously without interfering with one another. The elevating screw has ball bearings.

The dividing head is so constructed as to allow of a closer alignment of the spindle than the old style. It is very rigid and swings clear around so that the work may be operated from either side of the head. It has a No. 10 B. & S. taper, swings 11 inches, with 19 inches between centers. The back center is adjustable and can be raised and lowered by means of a worm and rack. The swivel vise has a graduated base, the jaws being $1\frac{3}{4} \times 9$ inches and the opening 6 inches.

Charles T. Silsby and William S. Silsby have severed all connections with the American and International Fire

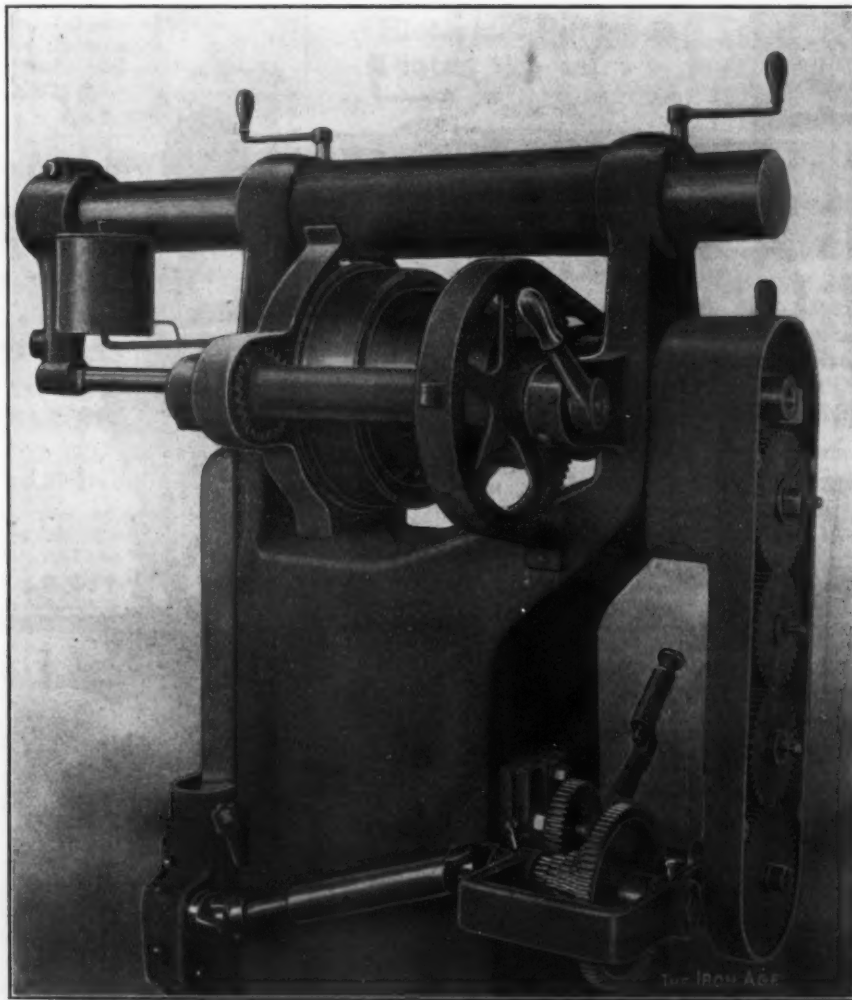


Fig. 2.—View Showing All Gear Feed Mechanism.

THE OESTERLEIN UNIVERSAL MILLING MACHINE.

76, 43, 36, 20, 12 and 7 revolutions per minute. The arm is 4 inches in diameter and the distance from the center of the spindle to the arm is 7 inches, and the greatest distance between the end of the spindle and the arbor bearing is $15\frac{1}{2}$ inches.

The table is 40 inches long, 9 inches wide, and has three T slots $\frac{5}{8}$ inch wide. It has a quick return of 3 to 1 and can be operated from either end. It has a screw feed and the screw has an adjusting nut to compensate for wear. The table is engaged to the feed by means of a clutch on the screw. This clutch does not ride on the screw directly, but slides on a sleeve so as not to injure the screw. The whole is a very simple and positive movement without any springs and stops the table every time within 1-1000 inch. It has an automatic longitudinal feed of 24 inches, an automatic cross feed of $7\frac{1}{2}$ inches, and can be lowered 18 inches from the center of the spindle.

The swivel is pivoted into the saddle and clamped on

Engine companies. Charles T. Silsby has been in the business for more than 30 years, having formerly been treasurer of the Silsby Mfg. Company of Seneca Falls, N. Y., who were absorbed by the American Fire Engine Company. At the time of his retirement he was also treasurer of the International Fire Engine Company. William S. Silsby has also been closely identified with manufacturing fire engines for more than 20 years and was formerly secretary of the Silsby Mfg. Company. The first fire engine was manufactured in 1856 by H. C. Silsby, father of Charles T. and William S. Silsby. He is still living and is 86 years of age. The plant was founded by him in 1845, and has been in continuous operation ever since.

The Fletcher & Crowell Company, Portland, Maine, manufacturers of beams, girders and general structural work, will build some time in the fall or winter a shop for structural work at South Portland.

Important Bankruptcy Decision.

Change in the Practice of Bankruptcy Courts.

WASHINGTON, D. C., May 5, 1903.—The United States Supreme Court has handed down a decision, the importance of which, in view of the extent to which it modifies the practice of bankruptcy tribunals, is second only to that of the comprehensive revision of the federal statute accomplished at the last session of Congress by the passage of the Ray bill. Bankruptcy experts do not hesitate to assert that the court's decision will affect several thousand cases and will operate retroactively as to cases adjudicated within the past year.

This important decision has been rendered in the case of *Jaquith, trustee, vs. Alden*, on appeal from the United States Circuit Court of Appeals for the first circuit, and holds in effect that the decision in the case of *Carson, Pirie, Scott & Co.*, in which it was held that Section 57g, requiring creditors receiving payments on account within four months of the filing of a bankrupt's petition to surrender such payments before being allowed to prove up the balance of their claims, does not apply in any case where the creditors sold goods or extended credit to the bankrupt after becoming insolvent, provided that such sales or credits exceed in amount the payments received on account.

It is argued by the court that when the net result of the transactions taking place after the bankrupt becomes insolvent is to increase his estate, the payments made cannot properly be regarded as preferences within the meaning of Section 57g. This decision completely upsets the practice of bankruptcy courts of original jurisdiction, which have held with practical unanimity that all payments received within four months of the filing of a bankrupt's petition must be surrendered in order to entitle the creditor to prove the remainder of his claim.

Payments on Running Accounts Are Not Preferences.

In the case just decided by the Supreme Court, it appears that the bankrupt became insolvent on August 15, but that his creditor, Alden, being in ignorance of this fact, sold to him material several times thereafter and prior to November 26, when the petition was filed. Payments were made from time to time, but on the filing of the petition the sum of \$546.89 had not been paid. The material received by the bankrupt was manufactured by him and became part of his estate. The question before the court, therefore, was whether any of the payments made to Alden were preferences which must be surrendered under Section 57g before his claim could be allowed. After stating these facts the Supreme Court describes briefly the case of *Carson, Pirie, Scott & Co.*, the decision in which is reaffirmed on the ground that "the estate of the insolvent as it existed at the date of the insolvency was diminished by the payment, and the creditor who received it was enabled to obtain a greater percentage of his debt than any other of the creditors of the same class." The court then proceeds to distinguish the present case from that of *Carson, Pirie, Scott & Co.*, as follows:

"In the present case all the goods were sold and delivered after the bankrupt's property has actually become insufficient to pay his debts, and his estate was increased in value thereby to an amount in excess of the payments made. The account was a running account and the effect of the payments was to keep it alive by the extension of new credits, with the net result of a gain to the estate of \$546.89 and a loss to the seller of that amount, less such dividends as the estate might pay. In these circumstances the payments were no more preferences than if the purchases had been made for cash. . . . All the material was sold and delivered after August 15, and neither of the items can properly be singled out as constituting an outstanding indebtedness, payment of which operated as a preference. The facts as found in *Carson, Pirie, Scott & Co. vs. Trust Company* were so entirely different from those existing here that this case is not controlled by that."

Two justices, Messrs. White and McKenna, dissent from this opinion, "not being able to concur in the rea-

sons by which the court distinguishes this case from that of *Carson, Pirie, Scott & Co.*, and deeming the latter case controlling in this."

Large Amounts May Be Recovered by Creditors.

With regard to the effect of this decision upon bankruptcy practice, Mr. Brandenburg, in charge of bankruptcy matters in the Department of Justice, and who was one of the strongest advocates of the repeal of Section 57g, said to the correspondent of *The Iron Age*:

"While this decision comes after the amendments of February 5, 1903, nevertheless it is far reaching and of vast consequence. There are still pending thousands of cases instituted prior to the passage of the Ray bill, in which creditors have been debarred from proving their claims by the literal interpretation of the decision of the Supreme Court in the case of *Carson, Pirie, Scott & Co.* The present decision does not dissent from that in the *Carson* case, but carefully distinguishes between the two and holds that wherever a bankrupt's estate has been benefited by additional credit, no preference is created if there is an excess of credit over the payments on account.

"By the same reasoning—and this is a point of the highest importance—if a creditor has extended any credit, though not equal to the amount of payments on account received by him, he should, nevertheless, only be required to surrender the difference between the credits and the payments. In all cases, therefore, in which creditors who come within this new decision have failed to prove their claims because of the decision in the *Carson* case, they should at once come forward and prove up their claims. The right to prove exists for one year after the date of adjudication, and the amounts that may be recovered will probably aggregate many hundred thousand dollars.

"This decision is clearly contrary to the rulings of the majority of the courts, which have assumed that the ruling in the *Carson* case required all payments on account to be treated as preferences irrespective of the facts. It is now the duty of every court to consider the facts in detail to determine whether or not the estate has been benefited by all the transactions in question.

"While the amendment of the law by the Ray bill affords relief in cases instituted prior to February 5, 1903, by requiring the surrender of a voidable preference only, or one which was received by the creditor with reasonable cause to believe that it was intended thereby to give a preference, this decision would also seem to be of great significance even under the changed conditions of the amended statute. Thus, although a merchant may know that a customer is insolvent, yet if he extends him further credit he may receive payments on account of such credit and not be obliged to surrender them in order to prove the balance of his claim. It is a singular fact that in the four years since the federal law became operative no one has heretofore had the enterprise to bring such a case as this to the United States Supreme Court. If the issue had been presented in this court at the outset, or immediately after the trial of the *Carson* case, the decision would have obviated to a great extent the wholesale criticism to which the statute was subjected by reason of the ruling on Section 57g." W. L. C.

The next meeting of the New England Foundrymen's Association will be at Hotel Essex, Boston, Wednesday evening, May 13. H. D. Leland, one of the Building Committee of the United States Machinery Company, having in charge the new shops of the company, will read a paper on "Interesting Points in Connection With Modern Machinery Manufacturing," and S. P. Patterson of the Empire Steel & Iron Company of Oxford, N. J., will read a paper on "The Quality of Pig Iron for Foundry Use as Indicated by Fracture and Analysis." The meetings of the New England Association have been so uniformly interesting in character that a large attendance is the rule.

A social meeting of the Western Society of Engineers was held at Kimball Hall, Chicago, Saturday evening, May 2. Professor Sparks of the University of Chicago presented a very interesting talk on "Early Chicago History and Old Landmarks."

Hollow Pressed Axles.*—I

BY CAMILLE MERCARDER, PITTSBURGH.

The axle is one of the most important elements used in rolling stock. Upon its strength depends the safety of the whole car superstructure, and upon its freedom from friction the economy in draft. While improved forms of construction have been devised in every branch of the railroad equipment, the axles for tenders and cars have been rather neglected, and this portion of the equipment has only kept pace with the other improvements by increasing its size and weight to gain the strength necessary for supporting the greatly increased loads which are now considered standard. A few years past, who would have thought of 100-pound rails, 125-ton engines, 100,000-pound steel cars and the many other improvements now considered necessary for the economical operation of our great railway systems?

It is a well recognized fact that steel articles manufactured by pressing are, as a rule, superior to articles made by any other method, and the present tendency is to develop this method in every branch of the iron and steel trade, especially as it insures the most economical production of articles needed in considerable quantities and makes them perfectly true and uniform to the template, permitting interchange of parts or the making of standard sizes. The writer proposes, in the present paper, to present, briefly, an account of the development in the manufacture of railroad axles on a large scale which was successfully demonstrated and accomplished at the Homestead Steel Works of the Carnegie Steel Company, Pittsburgh, Pa.

In order to produce, by pressing, an axle having varying diameters, the following method was proposed by the writer: A rolled round steel blank, uniformly heated, is inserted into a two-part die, having a matrix cavity in the form of a rough turned axle, Fig. 1. The diameter of the journals is made equal to the smallest diameter of the axle in the center, which corresponds to the diameter of the round blank. After the dies are clamped



Fig. 1.—Die Holding Blank.

about the heated round the latter is axially perforated simultaneously at both ends by two cylindrical punches, which force the metal of the blank to conform to the shape of the matrix die and fill out the same. The round is heated up to about 1000 degrees C. and the total hydraulic pressure required for penetration with a punch of 3 inches diameter amounts to about 50 tons. During the last end of the stroke a total hydraulic pressure of about 150 tons is required because the blank loses its initial heat through contact with the dies and because the end collars upset, at which time the metal may flow back against the punch.

Considering the small diameter to be pierced and the length of the punch, this pressure required to penetrate the blank is, apparently, very small, and it will be conceded by all familiar with the work that a prerequisite to entering the blank lies in allowing the metal to flow freely in the direction of the forward movement of the punch. The presence of the annular spaces between the blank and the die fulfills this condition, the metal flowing radially in the direction of the least resistance; the only back flow against the punch is at the end of the stroke. It is obvious that if this back flow existed initially the punch would bend and buckle before entering any great distance. In order to facilitate the initial entering of the punch the blank is now gripped by the dies for a length of only 4 inches at the journal portions, thus allowing the metal to flow more easily.

At the first experiments the blank was gripped throughout the length of the journals; and though the punch entered readily, the pressure applied was necessarily higher. The punch, being tapered, acts as a wedge and the pressure that can be exerted upon the axle blank is consequently enormous. In one of the experi-

ments the heated blank happened to be smaller in diameter than the gripping portions of the dies, and hence was not clamped by them. In this case the punch pushed the metal endwise and upset the blank into the matrix die. The inability of the metal to flow against the punch caused the upper die head, a steel casting weighing 25,000 pounds, to spread, and under a pressure of 200 tons upon the punch the die and the die head broke in the center. It is interesting to note that in this case the punch did not bend in the least, notwithstanding the fact that the blank, instead of being formed round, was compressed into an elliptical section, its upper part next to the top die having $\frac{1}{2}$ inch more metal than the lower portion.

The strength of the cast steel die head was determined upon the basis of ultimate tensile tests of its material, and it was found that a total lateral pressure of 2600 tons must have been exerted by the wedge action of the punch in order to break this casting. This occurrence shows that the metal blank, in being punched, can be subjected to an extraordinary pressure. This pressure is exerted throughout the entire length of the axle blank, for it is found that the central part of the axle, where the punch does not penetrate, conforms to the shape of the dies; see Fig. 2. It cannot be disputed

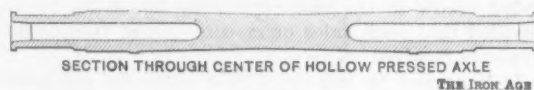


Fig. 2.

that this great compression improves the quality of the steel in the central part of the axle by destroying the injurious effects of segregation and piping usually found in ingot steel.

Regarding the temperature of the heated blank, it may be mentioned that it is absolutely necessary to have the greatest uniformity throughout the body of the blank, the temperature determining the resistance which the punch must overcome.

The following table, given by Dr. Julius K Coleman, showing the decrease of ultimate strength for medium hard steel for increased temperatures, may be of interest. The temperatures are given in degrees centigrade and the fiber stress in kilograms per square millimeter:

Decrease of the Ultimate Tensile Strength by Increasing the Temperature.

Temper- ature, Deg. Cels.	Tensile strength, Kilograms per square millimeter.	Decrease of T. S. Per cent.	Temper- ature, Deg. Cels.	Tensile strength, Kilograms per square millimeter.	Decrease of T. S. Per cent.
0	50	100	850	12.5	22
50	50	100	700	10.5	18
100	50	100	750	9.1	15
150	58.9	100	800	7.9	13
200	58.9	100	850	6.5	11
250	57.75	98	900	5.4	9
300	55.5	94	950	4.75	8
350	47.5	80	1,000	4	7
400	32.8	55	1,050	3.6	6
450	24.2	41	1,100	3.2	5
500	20	34	1,200	2.4	4
550	17.5	30	1,400	0	0
600	15	26			

The values are reproduced graphically in Fig. 3, and are instructive for the selection of the most favorable temperatures for punching.

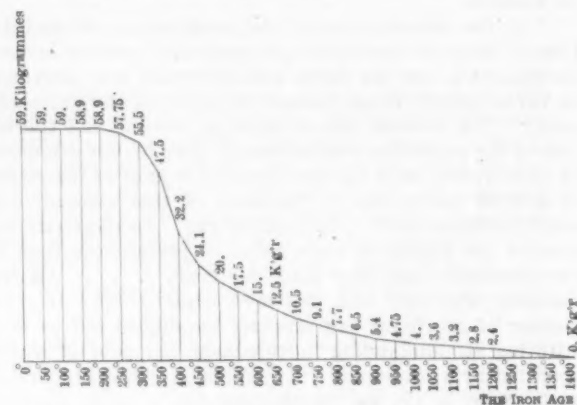
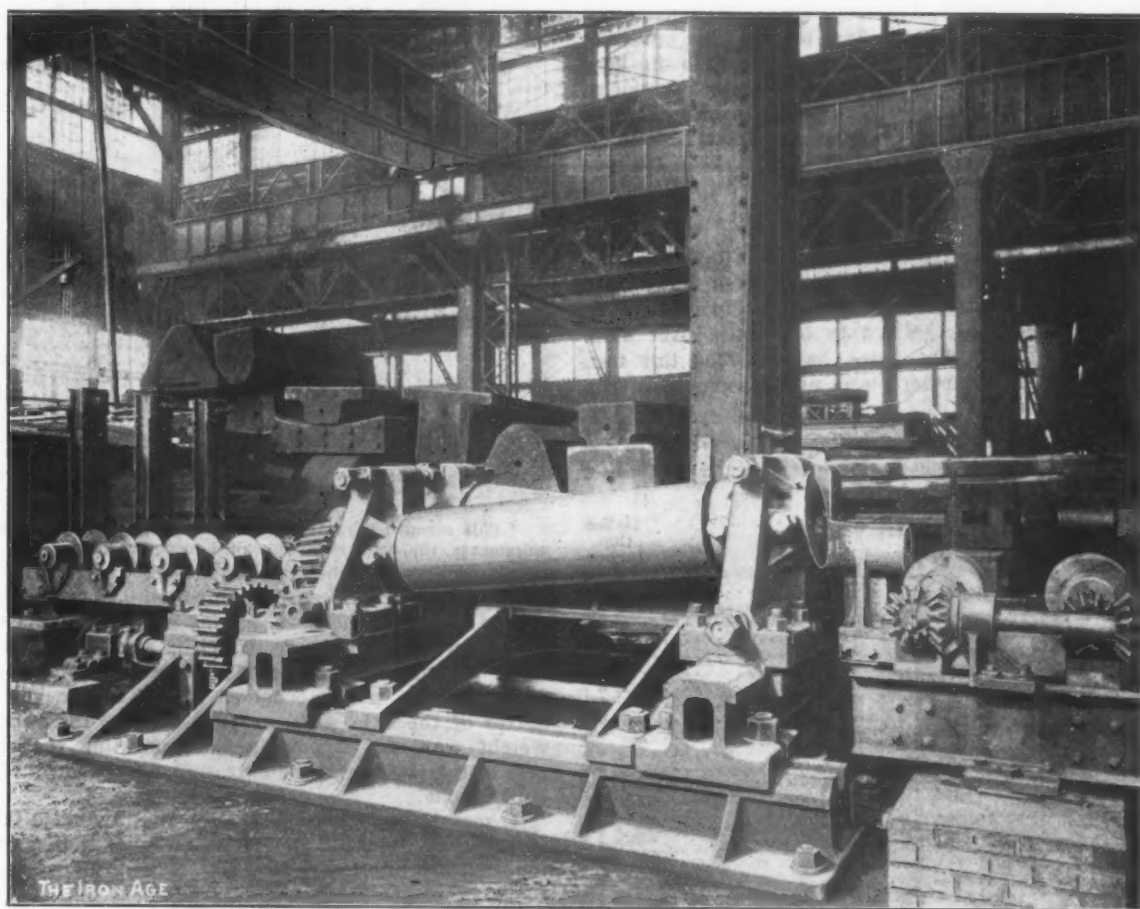


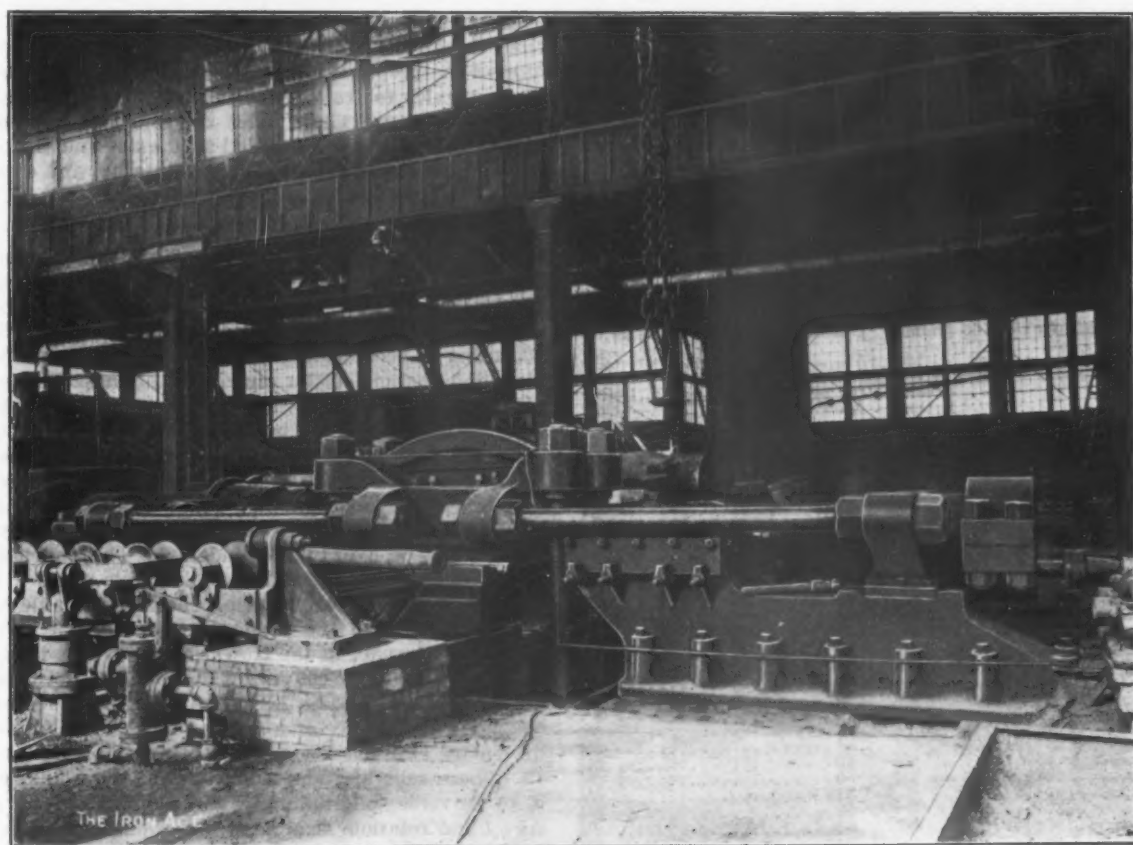
Fig. 3.—Decrease of Ultimate Strength by Increasing Temperature.

The experiments performed at Homestead gave evidence that the lower limit of temperature for success-

* A paper read at the May meeting of the Iron and Steel Institute.



The Blank Straightening Rolls.



The Mercader Hydraulic Axle Forging Machine.

ful punching was reached at about 850 degrees C., as near as could be judged. At this temperature the punch entered with difficulty, requiring about 250 tons initial pressure and about 500 tons final pressure for upsetting the collars; the metal, however, filled out the die very nicely, producing a fair looking axle. At a temperature of about 950 degrees C. the pressure required at the end of the stroke amounted to about 250 tons, and at about 1050 degrees C. a pressure of about 150 tons was found to be sufficient.

Tests of Axles.

In testing these axles Pennsylvania Railroad drop test specifications were followed—viz., seven blows at 43 feet of 1640 pounds weight, striking midway between supports 3 feet apart; axles to be turned over after every other blow. The axles, having stood this test, were subjected to further blows until destruction, with results as follows:

"A."—Axle Blank Punched at 850 Degrees C.

Weight of axle, 710 pounds; diameter of center, 5½ inches; size of journals, 5½ inches.

No. of blow.	Deflection. Inches.	No. of blow.	Deflection. Inches.
1.....	5½	37.....	4½
2.....	6	38.....	6½
3.....	4	39.....	3½
4.....	5½	40.....	6½
5.....	4	41.....	4
6.....	5½	42.....	6½
7*.....	4	43.....	3½
8.....	5½	44.....	6
9.....	4½	45.....	4½
10.....	5½	46.....	6½
11.....	4½	47.....	4½
12.....	6	48.....	6½
13.....	3½	49.....	3½
14.....	5½	50.....	6½
15.....	4½	51.....	4
16.....	6½	52.....	6½
17.....	4	53.....	4½
18.....	5½	54.....	7
19.....	4	55.....	4
20.....	6	56.....	6½
21.....	3½	57.....	3½
22.....	5½	58.....	6½
23.....	3½	59.....	4½
24.....	5½	60.....	6½
25.....	4	61.....	4½
26.....	6	62.....	7½
27.....	3½	63.....	4½
28.....	6½	64.....	7½
29.....	3½	65.....	3½
30.....	5½	66.....	6½
31.....	5½	67.....	4½
32.....	6½	68.....	6½
33.....	4½	69.....	4½
34.....	6½	70.....	6½
35.....	4½	71.....	4½
36.....	6½	72.....	Broke in center.

* This seventh blow fulfilling the Pennsylvania Railroad requirements, the tests were continued to destruction.

This test was most severe, the axle being turned over after every other blow.

The steel had the following analysis: Carbon, 0.47 per cent.; phosphorus, 0.023 per cent.; manganese, 0.50 per cent.; sulphur, 0.021 per cent.

"B."—Axle Blank Punched at 950 Degrees C.

Weight of axle, 705 pounds. Dimensions of axle same as before.

No. of blow.	Deflection. Inches.	No. of blow.	Deflection. Inches.
1.....	5	29.....	5½
2.....	5½	30.....	6
3.....	4½	31.....	6
4.....	4½	32.....	6
5.....	5½	33.....	6
6.....	5½	34.....	6
7*.....	5½	35.....	6½
8.....	5½	36.....	6½
9.....	5½	37.....	6½
10.....	5½	38.....	6½
11.....	5½	39.....	6½
12.....	5½	40.....	6½
13.....	5½	41.....	6½
14.....	5½	42.....	6
15.....	5½	43.....	6½
16.....	5½	44.....	6½
17.....	5½	45.....	5½
18.....	5½	46.....	6
19.....	5½	47.....	6
20.....	5½	48.....	6½
21.....	5½	49.....	6½
22.....	5½	50.....	6½
23.....	6	51.....	6½
24.....	6	52.....	6½
25.....	5½	53.....	6½
26.....	6	54.....	6½
27.....	5½	55.....	6½
28.....	4 11-16	56.....	Broke in center.

* This seventh blow fulfilling the Pennsylvania Railroad requirements, the tests were continued to destruction.

The steel had the following analysis: Carbon, 0.48 per cent.; phosphorus, 0.02 per cent.; manganese, 0.50 per cent.; sulphur, 0.02 per cent.

"C."—Axle Blank Punched at 1050 Degrees C.

Weight of axle, 700 pounds. Dimensions of axle same as before.

Axle was turned over after every other blow, the test being most severe.

No. of blow.	Deflection. Inches.	No. of blow.	Deflection. Inches.
1.....	3½	20.....	4½
2.....	4 11-16	21.....	3
3.....	3 3-16	22.....	4 11-16
4.....	4½	23.....	2½
5.....	3½	24.....	4½
6.....	4 9-16	25.....	3
7*.....	3 1-16	26.....	4½
8.....	4½	27.....	3 1-16
9.....	3	28.....	4 9-16
10.....	4½	29.....	3½
11.....	3 1-16	30.....	4½
12.....	4½	31.....	3
13.....	3	32.....	4½
14.....	4 9-16	33.....	3½
15.....	3	34.....	4½
16.....	4½	35.....	3½
17.....	3 1-16	36.....	4½
18.....	4 11-16	37.....	Broke in center.
19.....	2 15-16		

* This seventh blow fulfilling the Pennsylvania Railroad requirements, the tests were continued to destruction.

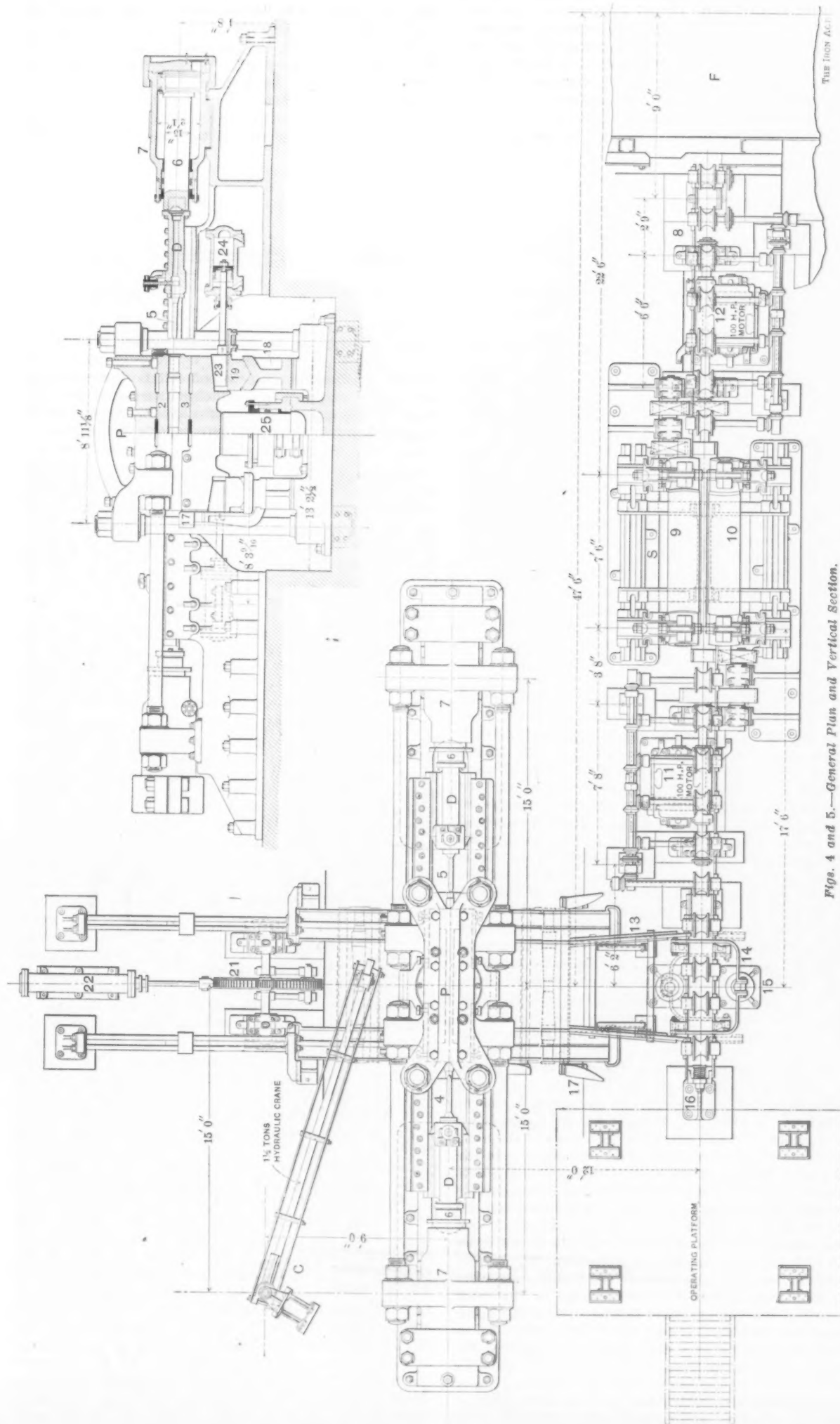
The analysis of the steel was: Carbon, 0.54 per cent.; manganese, 0.67 per cent.; phosphorus, 0.03 per cent.

The steel was too hard, having an excess percentage of carbon and manganese, which is also shown by the small deflection after the first blow in the drop test. After rupture, which occurred at the center, the two halves of the axle were weighed and the difference in weight was only 2 pounds, demonstrating the exactness of the shape and the uniform compression throughout the axle.

It may be opportune to mention that owing to the inability of the rolling mills to furnish rolled rounds of the required size without procuring a new roll equipment the axle blanks were forged from a bloom and then turned to exact size. Consequently, the blanks being worked under the steam hammer in a colder state than would have been the case were they shaped in the rolling mill, the steel might have been improved to a higher degree. The axle blanks were, however, reheated and therefore expanded before punching, and hence the influence of this forging can be disregarded, and it is safe, from these tests, to derive the conclusion that by determining the proper temperature for punching the hollow pressed axles for railway rolling stock can be made of superior quality. These axles are found to have much greater strength than the usual solid axles and the metal is more homogeneous, owing to the internal and external forging exerted upon a thin wall thickness.

The Hydraulic Axle Forging Machine.

In order to demonstrate the practicability of manufacturing railroad axles on a large scale by means of punching, an experimental machine, designed by the Carnegie Steel Company, was erected at the Homestead Works, according to accompanying drawings, Figs. 4 and 5, are plan and section of the punching and upsetting press, having two dies, 2 and 3, between which the metal blank is clamped and shaped. The dies have a matrix cavity, giving approximately the shape of the finished axle. The two upsetting punches, 4 and 5, are adapted to enter the matrix cavity longitudinally, being guided by a cross head, D, and moved in a longitudinal direction by the plungers, 6, of hydraulic cylinders 7. The punches are made sufficiently long and the plunger is given a sufficient stroke to enable them to penetrate the axle blank lengthwise beyond the wheel seat of the axle. F is a continuous furnace of the Howard Axle Works type, and 8 is a feed table for conveying the blanks. Between the furnace and the press is a straightening machine, 8, composed preferably of a pair of cross rolls, 9 and 10, driven by two 100 horse-power electric motors, 11 and 12. These rolls are adapted to receive the blank, cause it to traverse longitudinally and rotate, and by such travel and rotation straighten and round the blank perfectly. The diameter of the cross rolls being unequal, the blank is pressed against a bottom guide placed the entire length between the rolls, thus removing all scale and delivering the blank to the press with a clean and smooth



Figs. 4 and 5.—General Plan and Vertical Section.
THE MERCARDER HYDRAULIC AXLE FORGING MACHINE.

surface. The speed of the cross rolls has been made 160 revolutions per minute and the blank traverses 5 inches per revolution, requiring about 12 seconds to pass through them. A feed table conveys the blank to a position opposite to a lateral transfer device, 13, composed preferably of inclined skids and of a tilting frame, 14, which may be operated by a hydraulic cylinder, 15. When in this position the axle blank is stopped by coming into

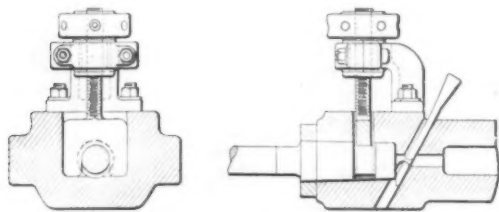


Fig. 6.—Fastening of Punch.

contact with a buffer, 16, whereupon the frame 14 is raised and the straightened blank is caused to roll down upon the bottom die 3, which is movable laterally upon a slide, so as to carry the blank under the upper die of the press. During its passage to the die the blank is guided at its ends by guides, 17, which center it lengthwise to suit the die cavity. To effect the lateral or traveling movement a lateral track, 18, is provided, upon which are mounted slides, 19, and upon which the die head 3 when in its lowest position rests and by which it is engaged. These slides are connected by a cross head, 20, and gearing, 21, to the piston of the hydraulic cylinder 22, and by the operation of this cylinder the slides carrying the die head and the dies are moved back and forth to the positions shown in the drawing. 23 and 23 are wedges which are mounted under the operative position of the die head and are moved by hydraulic cylinders, 24, forwardly underneath the die head, in order to support and lock it when elevated. The lifting of the die head 3 is effected by the plunger 25, which is set directly beneath the operative position of the die head, the axle blank being gripped and held thereby at the center and at the journals. To retain the dies in this position and to withstand the outward pressure exerted during the forging operation, the wedges 23 are projected under the die head. The dies 2 and 3 being thus locked by the wedges, the piercing punches 4 and 5 are brought into engagement with the ends of the axle blank, whereupon said punches penetrate the blank, pass beyond the wheel seat portions and displace the metal of the axle blank outward, so as to fill the cavities of the dies, forming the wheel seat and taper of the axle of the proper size and contour. The rear portions of the punch engage the ends of the axle blank and force the same inwardly toward the die cavity, and thus, by compressing them, shaping up these ends and forming the collars. The forging of the axle is then completed and it only remains to remove it from the machine and subsequently to turn the journals and wheel seats. To remove the axle the punches are retracted, the wedges are pulled back, the plunger lowered and the lower die head, with the axle, is carried on the slides to the opposite side of the machine. A hydraulic crane, C, having suspended a beam carrying hooks to enter the open ends of the axle, removes the same from the die and transports it to the cooling bed. The slides are then retracted into the first position to receive the new axle blank and the operations above described are repeated. The construction and the length of the press make it exceedingly difficult, if not impossible, to keep the hydraulic cylinders, the cross heads and the forming dies in a permanently correct alignment; therefore the ends of the piston rods were made to engage a ball bearing mounted in the cross heads, rendering the cylinders independent of the other parts of the press, so that only the forming dies need to be aligned correctly with the cross heads holding the punches. To bring the cross heads holding the punches into a perfectly straight line with the dies the cross heads rest upon false plates, which can be raised or lowered by wedges, 26, allowing adjustment of the height, and the guides are made adjustable by set bolts, 27, giving adjust-

ment in all directions as wanted. Similar means are provided for the adjustment of the upper matrix die to make it conform with the punches in case the dies are exchanged. The fastening of the punches to the cross heads was found to be satisfactory, the resistance to compression being taken up by a long taper, and that to pulling, which is comparatively small, by a locking wedge so that the punches can be changed very rapidly;

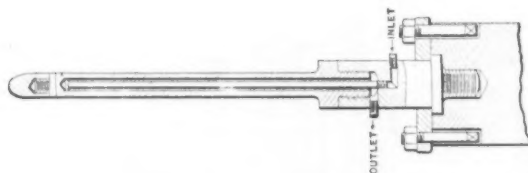


Fig. 7.—Water Cooled Steel Punch.

see Fig. 6. For upsetting the end collars of the axle the rear end of the punch is provided with a removable ring, 28, and by changing the thickness of this ring the length of the punch may be adjusted to properly fill the dies.

The Punch.

Many experiments have been made regarding the material for the punches. Water cooled tool steel punches with cast iron points removably secured were first tried; see Fig. 7. Such a punch afforded the necessary stiffness, and the cast iron nose withstood heat to a great degree, being self lubricating and not liable to become welded within the blank. The securing of the cast iron nose to the punch was found, however, to be too weak, owing partly to the small diameter of the punch and partly to the fact that having at that time no cross rolls, the blank was not straight, and the punch followed the course of the blank and hence fractured, the nose breaking and remaining in the axle. Solid crucible steel punches were then tried, but it was found that by the great pressure exerted the point of the punch welded to the axle blank, requiring great power to extract it. The point of the punch was covered with steel from the blank and was ragged, and therefore unfit for a second operation. To avoid the welding the punch was entered first for only 6 inches, then removed, the cavity filled with hard coal and the punching operation finished. The punch, being sufficiently lubricated by the gases from the coal, did not weld, but was caused to deviate on account of the coal not being evenly distributed around the punch. Solid charcoal iron punches were thereupon tested, but under the great pressure required for penetration they bent before entering the blank, deviating accordingly. If the temperature of the blank was high enough the deviation amounted to only about 1-16 inch, but if the steel was too cold the punches broke in the outer part, the broken end remaining in the axle.

In figuring the strength of these punches 35 tons are required to make them deviate 1-16 inch, showing again the small pressure required for punching. On the other hand, this deviation necessarily followed from the fact that the length of the punch was eight times its diameter, whereas it should not be over five times, according to accepted authority for cast iron. It may be 12 times the diameter for steel, or even more, according to percentage of carbon and treatment. As a result of these experiments, and following the practice of the Ehrhardt Works in Montbard, France, high carbon Bessemer steel containing 0.9 to 1 per cent. carbon was adopted and the punch was found to be very stiff. To overcome the difficulty of the welding the ends of the punches were provided with drop forged steel caps; see Fig. 8. These caps rest on the point of the punch, fitting the same neatly, and are a little larger in external diameter than the punch, in order to avoid friction between punch and the blank, resulting in a minimum of pressure required for penetration. By the pressure the caps are welded to the blank. The punch, being protected from injury, is very easily withdrawn, and, after cooling, it is ready to receive a new cap for the next operation. This arrangement proved to be very satisfac-

tory and practical. The caps can be made very cheaply, drop forging same of any scrap from steel plates or skelp. In order to avoid heating up of the punches the same are preferably black leaded, this being carried deep into the blank, the pierced hole having a greater diam-

ing in the furnace for three hours, giving, therefore, ample time for the steel to become uniformly heated and soaked throughout. The bottom of the furnace is inclined toward the hearth, and the blanks, instead of being pushed by hydraulic power, are rolled into it, dispens-

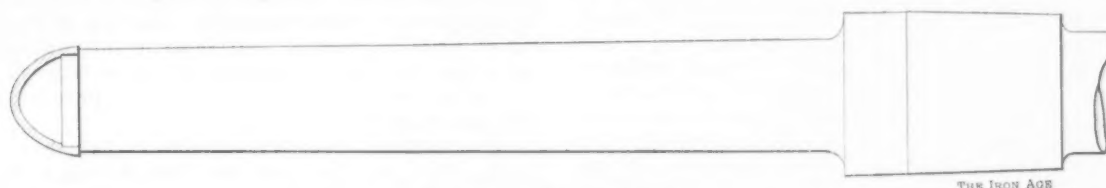


Fig. 9.—Steel Capped Punch.

eter than the punch, owing to the slightly larger size of the cap.

The results due to the intermediate straightening of the axle blanks are of the greatest practical importance for the preservation of the punches, as it saves them from bending. It is evident that if the blank reaches the dies in a bent condition, owing to the presence of the cavities, the blank will be straightened only in those parts gripped by the dies, leaving the blank unsupported between the journals and the center. The piercing punch, entering the center of the blank and having equal resistance in all directions around the punch, will follow the center of the blank; consequently, if there is a bend the punch must deviate.

The material employed for the matrix dies is best machine cast iron, water cooled to prevent a change in the shape and dimensions of the cavities. The dies show very little signs of wear and tear, and it appears that they will withstand the punching of a great number of axles, since the slight wear only smooths the inner surfaces of the dies. Further experiments in this direction might lead to the adoption of cast steel dies. To remove the axle readily all corners of the die are tapered, and to prevent sticking the cavities are preferably black leaded.

As already mentioned, greatly improved results are obtained, and much wear and tear of the dies prevented, if after heating the blank and before it is upset in the dies it is subjected to a straightening operation and rendered as perfectly straight as possible, instead of relying upon the dies themselves to remove the bends and irregularities which are necessarily produced during the heating of the blank in the furnace. Furthermore, by this step the scale gathered in the heating furnace is removed, and the rolled blank is made exactly true in diameter and perfectly round, delivering the axle blank in an ideal condition to the dies. To conform to the contraction of the steel in cooling off the cavities of the die correspond to the size of the axle in the hot state. The displacement of the punches is about 3 cubic inches greater than the difference between the cubic contents of the cavities and the blank, owing to the compression of the metal; see Fig. 1.

In order to cover all possible conditions and emergencies in the manufacture of these car axles the press should be designed for about 350 to 400 tons, total pressure being about 1500 pounds hydraulic pressure per square inch. To lengthen the life of the punches and avoid liability to their injury by the heat, the piercing should be carried out very rapidly. This can be accomplished in five to six seconds by connecting the hydraulic cylinders and the accumulator with a correspondingly large pipe line and by using specially designed four-way operating valves. The auxiliary parts of the press require for their operation a hydraulic pressure of 500 pounds per square inch. The quantity of water needed is comparatively small. One 22 x 36 $\frac{1}{2}$ x 5 $\frac{1}{2}$ x 36 inch high pressure pump and one 22 x 36 $\frac{1}{2}$ x 10 x 36 inch low pressure pump, requiring a total of about 200 horsepower, are sufficient to serve four presses, aggregating the punching of 1200 axles in 20 hours.

One continuous furnace and one pair of cross rolls furnish the blanks to two presses, alternately delivering one blank every two minutes. The length of the continuous furnace for heating the axle blanks is sufficient to retain 90 blanks at the same time, each blank remain-

ing with a hydraulic charging apparatus and the customary cooling water pipes needed to protect the bottom from wear and tear. The blanks are gradually rolled down the incline toward the hearth, and when ready for punching are rolled into a discharge groove containing two water cooled pipes placed close together to receive the blank and guide it out from the furnace when pushed by a hydraulic pusher toward the cross rolls.

With the experimental plant erected in Homestead, the time required to make one axle, all operations included, did not exceed two minutes. Allowing, again, two minutes for cleaning and black leading the dies and for cooling and capping the punches, the capacity of one press will be 15 axles per hour, or 300 axles, 5 $\frac{1}{2}$ x 10 inch journal, per 20 hours, which is fully three times the quantity accomplished with one hammer by the best American practice. The number of men required to operate the press remains the same as needed at the hammer to forge five 5 $\frac{1}{2}$ x 10 inch journal axles per hour. The machine above described has many advantages. It is effective in construction and produces a strong and light axle which contains the cardinal combination desired—namely, minimum weight and maximum strength.

Improvements at the North Works of the Illinois Steel Company.—At the North Works of the Illinois Steel Company plans have been completed for the erection of a new stock storage house, 190 x 300 feet, which will be equipped with three 10-ton cranes of 75-foot span, each provided with two independent trolleys, and one 5-ton crane of 40-foot span. These cranes will run the entire length of the storage building. There will also be provided for loading purposes a crane runway 225 feet long, equipped with a 20-ton crane of 75-foot span, provided with two independent 10-ton trolleys. A new power house, 50 x 75 feet, will also be erected and will be equipped with a 2300-foot duplex compound Rand air compressor; a 950-foot Ingersoll compressor also, now in service; one 200-kw. and one 100-kw. generator. New equipment has also been secured as follows: One coping machine, with cutters revolving around a vertical axis; one guillotine blade shears, with 6-inch blades, having a 24-inch overhang; one double angle shears, revolving about a vertical axis, with independent clutches for working each side separately and having a capacity for the heaviest 8 x 8 inch angles; one 51-inch diameter high speed fusion saw, and one 1 $\frac{1}{2}$ -inch Acme header.

On May 12 the New York section of the Verein Deutscher Chemiker will celebrate the centennial of Justus Liebig, to which the members of the American Chemical Society, the Society of Chemical Industry, the American Electrochemical Society and the Chemists' Club are invited. Prof. Ira Remsen, president of Johns Hopkins University, and Prof. William H. Brewer of Yale University, will deliver orations. Dr. C. Duisberg, vice-president of the parent society, and Prof. Charles F. Chandler of Columbia University will also address the meeting. The exercises will be held in the assembly hall of the Chemists' Club, 108 West Fifty-fifth street, New York.

Machinists in the employ of the Carborundum Company, Niagara Falls, are on strike and one department of the plant is idle in consequence. The men demand a nine-hour day.

The Boiler Problem in the Navy.

Cause of the Trouble in the "Maine's" Boilers.

WASHINGTON, D. C., May 5, 1903.—Preliminary reports concerning the boilers of the battle ship "Maine," which have been received by the Navy Department, have convinced the officials of the Bureau of Steam Engineering that the injuries noted cannot be attributed in any degree to the shock of the recoil of the ship's guns in which service charges of smokeless powder were used and which resulted in such damage to turret and deck supports and gun mounts. On the contrary, the experts of the bureau are now unanimous in the belief that the trouble is due to the type of boiler, which Chief Engineer Melville has for some time maintained is "too tender" for use on battle ships, although admirable for installation on land where the water level in the boiler is not subject to such sudden changes as result from the rolling or pitching of a vessel at sea.

The special board, composed of Commanders Perry, Bailey and Canaga, appointed by Secretary Moody to examine the boilers of the "Maine," have made a preliminary report in which it is stated that a considerable number of tubes distributed throughout three of the boilers have been found to be so damaged as to make it clear that the water was forced out of them by the heat of the fires, the tubes being bent out of position from $\frac{1}{2}$ inch to 6 inches. In some cases the tubes were bent downward, while in other cases they buckled upward. Certain tubes are also found to have burst, which is attributed to burning out. The board, having been instructed to estimate the cost of repairs to the boilers, state that from \$10,000 to \$15,000 would be required to put the battery in shape for another trial, including the expense of renewing the damaged tubes, providing new gauges and glasses and installing a device to be operated from the deck, by which individual boilers may be cut out in case of further damage during the trial.

The Niclausse Boiler Unsuitable to Naval Service.

The importance of these conclusions, which will not be officially announced until the final report of the special board referred to has been received, can hardly be overestimated as they will carry great weight, not only with our own naval authorities but with the admiralities of the world. The immediate effect in the United States Navy will probably be to put a stop to the installation of this type of boiler and will cause great care to be taken in the management and inspection of those of our war ships in which the boiler has been installed, including the "Colorado," "Pennsylvania," "Virginia," "Georgia" and "Nevada," the last mentioned being a monitor.

While it will no doubt be very disappointing to the American people as well as to the naval service to learn that no less than six of our war ships are fitted with boilers which are unsuited to sea service, yet there is some consolation in the fact that our comparative naval strength is not reduced by this discovery. The Niclausse boiler is a French invention, and has been installed in a large portion of the war ships recently contracted for by the French Government, the admiralty authorities following the rule of using French devices and material of domestic manufacture wherever possible. Germany has also built a number of vessels in which the Niclausse boiler has been used, and in a much larger number has installed a Durr boiler, of the same general type, employing the Field "tube within a tube." England has installed the Niclausse boiler in two gunboats, and has given contracts for its installation in two battle ships and several armored cruisers. The Russian Government has also used this boiler in a considerable number of war ships, but has decided not to employ it hereafter.

The officials of the Bureau of Steam Engineering freely concede that the Niclausse boiler possesses certain distinct advantages in that an installation of high power can be made within a very limited space and also because of the economy of fuel consumption, which has proven very attractive to naval authorities anxious to extend the steaming radius of all the vessels of the navy. The great disadvantage in the Niclausse type, however, in the

opinion of the officials of the Bureau of Steam Engineering, is the fact that it is so constructed that there is a strong tendency when the boilers are forced for the water to leave the ends of the tubes, which are then apt to burn out. This tendency is greatly accentuated when the vessel rolls or pitches, which, of course, is a decided disadvantage from a naval standpoint. Not only is the bursting of tubes as reported attributed to this weakness of the boiler, but also the bending, which is believed to be due to the heating of the tubes out of which the water has been driven.

The "Maine's" battery contains no less than 12,000 tubes, and it is pointed out that should even a fraction of 1 per cent. of these tubes, scattered throughout the boilers, become damaged the entire ship would be disabled. It has been found that "foaming" in the boilers, as well as the forcing of the fires and the pitching of the vessel, is apt to clear the ends of the tubes of water, permitting them to burn out or bend.

Naval officers now emphasize the fact that for the past 20 years Admiral Melville has strenuously resisted all efforts to cut down boiler and engine weights, and it is pointed out that experience has confirmed his opinion, and will convince naval authorities in all countries that weights should be economized only in auxiliaries and luxuries above the protective deck rather than in the important and constantly working machinery beneath that structure. Naval engineers declare that, because the boilers are not in sight of the casual visitor, the constructors are disposed to cut them down as much as possible while adding to the useful but not absolutely necessary auxiliaries and the wholly unnecessary furnishings of the ship above the protective deck.

The Problem of the Water Tube Boiler.

In this connection Admiral Melville calls attention to an extract from a report made a few months ago by the Edwards Board upon the "problem of the water tube boiler," in which was emphasized the vast importance which, in the Admiral's opinion, is now greatly underestimated, of an efficient boiler, an importance which he thinks is second to no other feature of construction or equipment. This extract is as follows:

"The present problem of the modern battle ship is not that of the gun and its mount, but the boiler and its installation. The gun is mounted in the most favorable position for care, operation and inspection, and practically everything on board ship is subordinated to its efficient working. Since a large factor of safety is given to every part of the weapon that is subjected to shock, the gun can only be impaired by incompetence, neglect, or by chemical action of the explosive. Before it is placed in a turret or redoubt it is fully tested, but it is never put on board ship if there is a suspicion that it has been subjected to undue strain.

"The boiler, on the other hand, is placed beneath the protective deck just above the bilges and near the bunkers. It is installed in compartments that are avoided rather than sought by other than engineer officers. While a careful test is made of the structure before being placed in the vessel, it must necessarily be subjected, even before installation, to conditions that often impair its strength. In its construction many of the plates are subjected to the severest kind of flanging, and its efficient inspection is much more difficult than that of the gun. As there has been a progressive demand for increased steam pressure, the factors of safety used in designing a marine boiler are progressively becoming smaller. The conditions under which the boiler is operated necessarily cause some of the parts to be subjected to rapid corrosion, and only incessant care and attention can prevent the disablement or rupture of the structure.

"The experience of the United States Navy with the boilers of the torpedo boats and torpedo boat destroyers ought to afford some startling evidence as to the manner in which incompetent or untrained men can impair or destroy the efficiency of these steam generators. The agitation in Great Britain over the navy boiler question ought also to convince naval administrators that the boiler problem is the naval problem of the hour. In view of the British experience with the Belleville boiler, it is not surprising that the general public of that empire regard

the boiler commission, now in session, as the most important board appointed by the Admiralty during the past ten years. The membership of this board comprises distinguished experts within and without the naval service. This board has been in session nearly two years investigating the question as to which type of marine boiler is most suitable for use in the navy as the one of approved design. The Admiralty regard the solution of this problem as of vital importance to the efficiency of the British fleet, for it has been discovered, after installing over a million and a quarter of horse-power of boilers of particular design, that a doubt has risen as to whether or not this particular form of boiler should have been settled upon as the approved type for the naval service. A series of evaporative and endurance tests have been made, and the more carefully the question is investigated the more important does it appear in relation to the operation of a modern navy.

"The British boiler commission will have a very important influence upon naval construction, since it will cause thoughtful experts to give more attention to the design, construction, installation and operation of the boiler. One must have experience in the operation of a modern marine boiler to appreciate the intelligence, skill and care that must be devoted to keeping it in a state of efficiency. The boilers are the lungs of a vessel, although this fact is not generally understood. It was not many years ago when a naval officer of high rank spoke of the boilers as "the steam tanks in the bottom of the ship," it being probably his impression that these tanks could be tapped like a gasometer, and it was the fault of the fireman if the boiler output was not sufficient at all times.

"While the war ship may be nothing more than a gun platform, it requires considerable power to move a platform of 14,500 tons at a high speed in a heavy sea. This platform is not only expected to be manoeuvred rapidly, but to steam uninterruptedly for a distance one-fourth the way around the world. The battle ship that cannot make the enemy's coast the first line of defense is limited in the field of its usefulness, and when operating at such distance the value of the boiler factor comes only second to the value of the factor of the gun.

"With a deep appreciation of the necessity of soon settling upon an approved type of marine boiler for the battle ships and armored cruisers of the United States Navy, the bureau has invited competition among designers. It believes, however, that if possible a boiler of American design should be adopted, and that this marine boiler should be a development of one in general use on shore. By seeking a design that is familiar to thousands of firemen on shore, an important military advantage would be secured, since in time of emergency there could thus be recruited for the naval service water tenders and firemen who had operated almost similar steam generators, and who would therefore require but little training to familiarize themselves with the duty on board ship. While the navy can and ought to do some efficient work in training firemen, it would be very advantageous to the service if the enlisted force in the stoke holes could have considerable preliminary training with boilers of nearly like design to the one in most extensive use as the approved type for the navy.

"There are now being built for the battle ships in course of construction water tube boilers of three distinct types. Practically four-sevenths of this boiler power will be of the Babcock & Wilcox design, two-sevenths of the Niclausse and one-seventh of the Thornycroft. These types include the best of representative groups of water tube boilers, and a sufficient installation of each kind will be secured to test the efficiency and endurance of the several designs."

The suggestion having been made that the boilers installed on the "Maine" enabled her to be built for \$30,000 or \$40,000 less than it would have cost to equip her with boilers of another pattern, it is urged by engineer officers that this consideration should not govern the Department for a moment. The cost of a battery of boilers of the average type for the "Maine" is perhaps \$300,000. The highest type now constructed would cost perhaps 15 per cent. more than this figure, while the cheapest cannot be built at a saving of more than 10 or 15 per cent. Under the circumstances, therefore, it is urged that it is

very poor economy to attempt to cut down the cost of boilers of battle ships which are likely to see most of their service at great distances from home ports.

W. L. C.

The Scotch Plate Combination.

Under the heading "A Combine That Has Failed," the *London Economist* for April 25 prints the following very interesting statement:

Close upon a year ago the leading steel makers in the west of Scotland resolved among themselves that the conditions of trade were favorable for a combination in the fixing of prices for marine boiler plates. Demand for material on home account was good, and orders were flowing in freely from the United States, and the parties to the suggestion, seeing, eye to eye, £7 10s. per ton, plus Scotch steel makers' extras (which run from £3 to £4 per ton), was fixed upon as the selling price for the class of plates referred to—that is, for home consumption—while for export business the figure was put at 20 shillings per ton less. Ship plates were also looked at, but before anything in that connection could be done one works, which confined itself to the make of ship plates, but the proprietors of which have always declined to be parties to any compact, whether as regards wages or prices, had to be reckoned with. Negotiations were opened and proceeded for some time with the managers of the business mentioned, to no purpose, however. They held out for and intimated that they would follow their usual independent lines of action. Thereupon the seemingly more powerful concerns resorted to what was nothing short of a policy of compulsion. Strong in their position of being able to command big and profitable prices for boiler plates, they took in hand the quotations for ship plates and reduced them to a point that threatened the very existence of their obstreperous opponent. Instead of knuckling down, however, as many firms would excusably have done, that concern boldly faced the situation, laid down up to date boiler plate rolling plant, and were soon able to enter the market as sellers, at 5 shillings per ton under the combine price.

For a period the defensive attack was ignored, but the unpleasant fact was gradually borne home that the enemy was making headway, capturing orders on all hands from consumers in every part of the kingdom, who had been irritated at the action of the authors of the upward movement, and at the high terms which they had been constrained to concede. In the hope of retrieving their grip the combine then at one stroke reduced their quotation to £6 10s., still plus the extras, and this was answered by the outsider going to £6 5s. And the combine has not been bettered. Buyers in Lancashire, the North of England and the Clyde valley have not only remained loyal, but have extended increasing support to the independent company, with the result, it is claimed, that they are now rolling three-fourths of what is regarded as the Scottish make of boiler plates. The combine exists, but for all effectual purposes in name only. It is reported that one of the firms to it has this week been forced into taking an order at no more than £6 a ton. The output per annum runs to something over 20,000 tons, and what that figure means to the producers and consumers as compared with £7 10s. can be readily understood.

It may be that the fight is not yet over; the probability is that it is. The aggressors have been signally beaten, and an object lesson has been given—well will it be if it has been learned, and if it should not be without effect in other trades—of the danger of overmasterfulness in business tactics. Had the firm in question been left alone to jog along in their own quiet way, boiler plates would have been costing buyers 25 to 30 shillings a ton more than they are now. But out of evil, as it may be said, good has come, and the result has given, and is giving, the liveliest satisfaction in English and Scottish consuming circles generally.

Cook County Founders' Association.—The foundrymen of Cook County organized on the afternoon of Thursday, April 30, under the name of the Cook County Founders' Association. Constitution and by-laws were

adopted after some changes had been recommended in the by-laws, which were again referred to the committee to make the amendments and to report at a meeting to be held on Tuesday, May 5, when officers will be elected. The Conference Committee, which met the representatives of the Iron Molders' Union of North America, were instructed to accede to the demands of the union, the founders having resolved to pay \$3 per day, nine hours to constitute a day's work. The scarcity of iron molders at the present time more than anything else seems to have influenced the association.

The Snow Steam Pump Works.

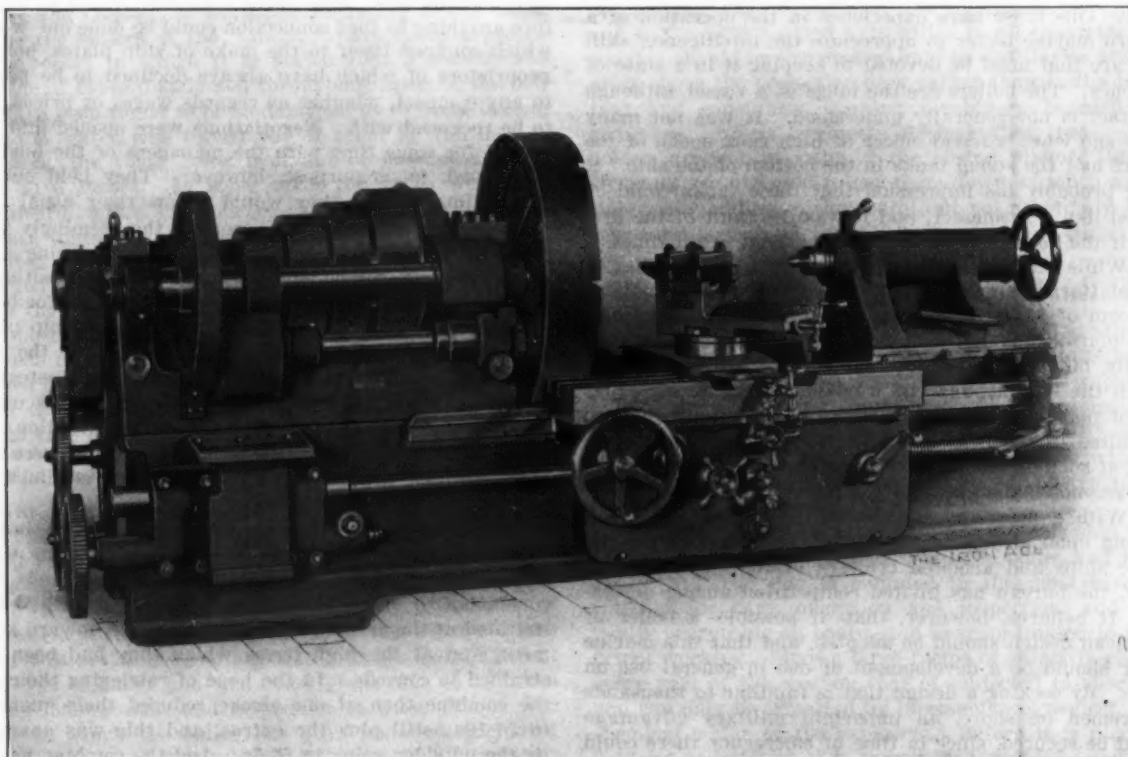
The Snow Steam Pump Works of Buffalo, N. Y., are greatly enlarging their plant in that city, and the additional buildings are nearing completion. They comprise a foundry 134 x 400 feet, a machine shop 110 x 550 feet and a number of smaller buildings. Both the foundry and machine shop are of heavy steel construction. The foundry is built with a center bay and two side bays.

flasks, carrying a 20-ton Niles crane. At one end of this outside traveling crane is located the new casting cleaning house, 70 x 120, and adjacent a large pattern storage house is to be erected. The old foundry is being remodeled into a steel casting foundry. Most of the machine tools and electric equipment have been contracted for. It is expected that the new shops and equipment will be in readiness for operation in about 90 days, when the working force will be increased to approximately 1500 men.

Two of the largest gas engines ever constructed are now being built at these works. They are gas engine gas compressors of 4500 horse-power each, and are to be used for pumping natural gas from West Virginia to Cleveland, Ohio.

The New Bradford Triple Geared Engine Lathe.

The new 36-inch triple geared engine lathe designed and built by the Bradford Machine Tool Company of Cincinnati has an air of massiveness which will be ap-



THE NEW BRADFORD TRIPLE GEARED ENGINE LATHE.

The center bay is of 65 feet span and is equipped with two 30-ton and one 20-ton Niles electric traveling cranes. One side bay is equipped with three 5-ton cranes of the same make, and the other bay, which is to be used for core making and sand mixing machines, is equipped with hand cranes for light molding floors. This building is finished and foundry work has been started, but an extension 115 feet in length will soon be added. The machine shop consists of two bays 50 and 60 feet in width respectively, and each 550 feet in length. One of the bays will have a height of 50 feet under the hook of the crane, and the other 30 feet. One end of both bays will be used for erecting large pumping engines, and the remainder of both bays will be equipped with large machine tools. There will be no galleries, the two sections, or large bays, being separated by steel center columns carrying runways at a high elevation for the electric cranes. The new machine shop will be served by six traveling cranes—four 30-ton and two 20-ton—Niles electric. The erecting floor of the present machine shop will also be equipped with large machine tools, and these, as well as all of the large machine tools in the new shops, will be electrically driven, Niagara Falls power being used. Along the outside of the foundry building for its entire length a steel supported traveling crane with a span of 70 feet is constructed over a storage yard for large castings and

preciated by an examination of the accompanying half tone. Not only is the bed very heavy, well braced and properly proportioned, but the inside V's and center form an equilateral triangle which adds much to the stability of the machine. The spindle is of high carbon crucible steel and runs in phosphor bronze bearings. The main bearing is 6 inches in diameter by 10 inches long, and the back bearing is 5 inches in diameter by 9 inches long. The cone has five steps for a 5¼-inch belt. The ratio of the back gear is 6.25 to 1 and the triple gear 40.61 to 1, which gives 15 speeds, increasing in geometrical ratio. In the front of the bed and under the head stock can be seen a nest of gears, six in number; the lower ones are drivers and the upper ones are keyed to the lead screw. By means of a slip key controlled by a pinion with a hexagonal head either set of gears may be brought into action, thus giving three changes of feed or three different threads without changing the end gears. These changes in connection with the usual change gears give a wide range of threads.

It is often found necessary to cut threads of very coarse pitch and outside of the range usually found on engine lathes. Incorporated in the construction of this lathe, however, are means whereby this may be accomplished without any complications or compounding of gears. In the rear end of the head stock is a sliding

bearing supporting a short shaft having gears on either end. As they are shown in the drawing the inner gear is in mesh with the small gear on the cone and from the cone motion is communicated direct to the screw. In this case the ratio is 8 to 1 when driven from the spindle, so that if the lathe is geared to cut 1-inch pitch it would, with this arrangement, cut a thread of 8 inches pitch. This feature commends itself without further comment.

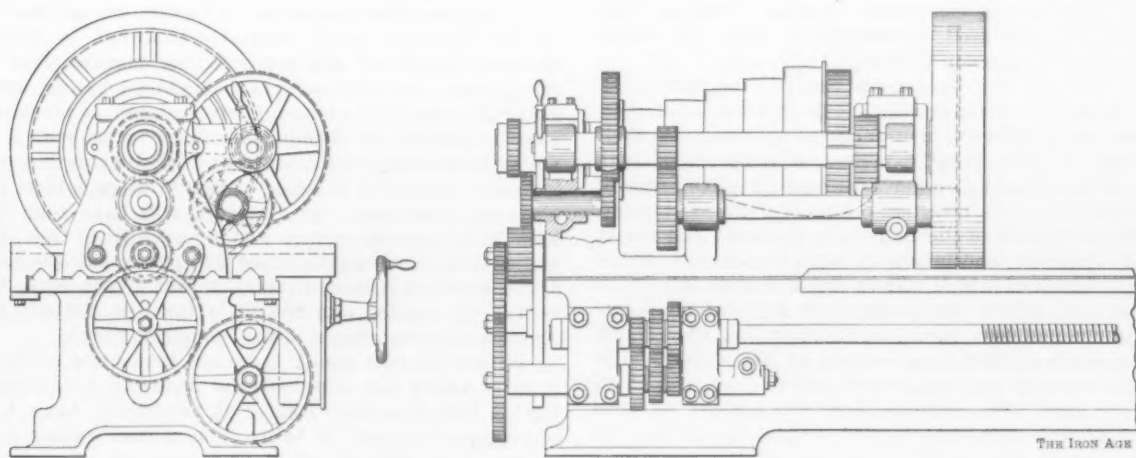
The carriage is scraped to an accurate bearing on the bed of 48 inches. The bridge is extra wide, thus insuring stiffness where most needed. It is fitted with a compound rest, with power feed in all directions, and the top slide has a movement of 12 inches.

The apron is substantial, all shafts having double bearings and some of them being bushed with phosphor bronze. It is furnished with a reverse and a simple non-interfering device which renders it impossible to engage more than one feed at a time. The screw is splined its entire length, but the threads are only used for screw cutting. It is 2 7-16 inches in diameter, the pitch being $\frac{1}{2}$ inch. The tail stock spindle has a long movement, is of large diameter and has a bearing in the tall head its

some two years, is to be enlarged, and improvements made in the shape of a new machine shop, additional boilers and another blowing engine. It is expected that the stack will be blown in about August 1. The annual capacity is 45,000 tons, and the product will be foundry and forge irons, made from local brown ores, and malleable iron made from Ducktown and Cranberry ores and ores from local mines, which the company will open up during the summer. The officers are C. P. Perin, president; I. L. Elliot, vice-president; T. C. Clarke, treasurer, and V. S. Paine, general manager.

Labor at Providence.

The Molders' Union of Providence have taken no new step in their demands for shorter hours and increased wages. The employers were given until April 15 to reply to the demand. The only exceptions were the Brown & Sharpe Mfg. Company, the Crompton & Knowles Loom Works and the New England Butt Company. The last named concern had previously granted



Details of Head Stock.

THE NEW BRADFORD TRIPLE GEARED ENGINE LATHE.

full length, and as a whole is easily moved along the shears by a rack and pinion.

Trouble With Molders at Chester.—The agitation among the molders of Chester, Pa., is becoming more acute, and it looks as though several of the plants would be shut down within the next few days. The local lodge of the Iron Molders' Union of North America are making a test at the Penn Steel Casting & Machine Company's Works, where over 400 men are employed, of whom 48 or 50 are molders. Mortimer H. Bickley, president of the corporation, refused to sign the wage scale, and said that "the issue would be forced." So far only the Barr Pump Works, at Marcus Hook, and the Solid Steel Casting Company have signed the scale. The agreement drawn up by the molders provides that the minimum wage shall be \$3 a day for all molders; that not more than one apprentice shall be allowed to eight molders, and makes other requirements agreeable to the national officers of the union. Of the other concerns in Chester, Wetherill & Co., the American Steel Casting Company, the Seaboard and Roach's Shipyard are independent shops—that is, they do not belong to the National Founders' Association, while the Gruson Iron Works, at Eddystone, Vulcan Iron Works, Penn Steel Casting Company and Solid Steel Casting Company belong to this association.

Embreville Furnace To Be Started.—The Embree Iron Company, 71 Broadway, New York, who were recently organized, have purchased Embreille furnace, at Embreille, Tenn., from the Virginia Iron, Coal & Coke Company. The furnace, which has been out of blast for

a 56-hour week. The Brown & Sharpe Company and the Crompton & Knowles Works were clear exceptions, the conditions in their foundries being the same as those existing in other Providence foundries. In the case of the Brown & Sharpe Company it is understood that their molders refused to be parties to such a demand.

As was stated in *The Iron Age* last week the Molders' Union are far from being a unit in their demand. This is becoming more and more pronounced. The announcement that Vice-President Valentine of the National Association is to come to Providence is not received with favor by a large majority of the molders, and of the coremakers, who are also in the demand. The majority wish no trouble. They have had enough of strikes in Providence. They want to work and say that they wish Vice-President Valentine and all other outsiders would keep their hands off. The present feeling among both employers and employees is that there is little chance of a strike.

The journeymen plumbers of Providence went on strike Monday, about 200 men refusing to work. They demand \$3.50 a day for eight hours' work, double time for overtime, and a Saturday half holiday, without pay, the year round. The present minimum is \$3 for an eight-hour day.

The large contractors of Providence have settled with their bricklayers and carpenters.

The structural iron workers of Providence, R. I., are on strike. The employers have refused to grant the demands of the Iron Workers' Union, which are sweeping. The men asked for 40 cents an hour for an eight-hour day, with time and a half for overtime and double time for Sunday and holiday work. About 100 men are affected.

Activity in Coal and Coke Development.

BY FREDERICK E. SAWARD.

Work continues along the line of development in our coal and coke industries. With the opening of good weather there come to hand many reports of this activity, and it does not appear to be confined to any portion of the country. Wherever the coal is found near to a market it is to be worked.

Even in Pennsylvania there is no letting up to the building of coke ovens, and activity continues in the Pittsburgh district and among independent manufacturers at an increasing rate. Among the contracts for the extension of coke plants and for the building of new ones which have been awarded during the past week are those of the Victoria Coal Company for 50 new ovens at Perryopolis, Pa.; the Connellsville Coke Company for new ovens in Fayette County; the Oak Ridge Coal & Coke Company for 50 new ovens at Hastings, Pa., and a number of smaller plants along the Monongahela River. The Gilmore Coal & Coke Company have also increased their coking coal lands, and the O'Connor Coke Company have secured extensive new lands for coking purposes in Washington County.

The Nittany and Bellefonte furnaces of Bellefonte, Pa., are another interest which will soon have an independent supply of coke, manufactured expressly for their own use by a company composed of members of both firms. These gentlemen have purchased 1100 acres of coal lands in the southwestern corner of Jefferson County, Pa., situated between the Bell's Gap Railroad and the B. R. & P. Railroad, and intend to begin the erection of 200 coke ovens, all of which will be finished next fall.

Henry W. Oliver has bought 1000 acres of land containing the gas coal seam near Finleyville, Pa. It adjoins a tract of 4000 acres owned by Mr. Oliver. The sale was for cash and the price is said to have been about \$200 per acre. The price is about the highest yet paid for Pittsburgh vein coal in that neighborhood, but the figures quoted were paid on account of the quality of high rate gas coal. The lines of value are being more and more strongly drawn between ordinary steam or domestic coal and the gas coal. It is the opinion of many coal men that there will in the future be as marked and as great a relative difference in value per acre between gas coal and steam coal as has existed for a long time between Connellsville coking coal and gas coal.

In line with other large independent concerns of the country the Wheeling Steel & Iron Company have secured their own coke supply by the purchase of property on the Monongahela River, investing no less than \$500,000. Application has been made for a charter for the Wheeling Coke Company, with a capitalization of \$50,000. The Wheeling Coke Company recently purchased 1000 acres of coal land in Luzerne township along the Monongahela River from J. V. Thompson and others for \$500,000. Their holdings are close to those of the La Belle Coke Company and adjoin those of the Crucible Steel Company. The Wheeling Company will build 100 ovens at once. The company are controlled by the Wheeling Iron & Steel Company interests and the stockholders are all stockholders in that firm.

At West Superior there has been a coking coal plant for some years past, and now there is a small by-product plant in the same vicinity, for work has been commenced on the construction of the coke ovens in connection with the plant of the Zenith Furnace Company at West Duluth. The driving of the pilings on which the docks will rest has begun. On the docks the coke ovens will be constructed. The work will be rushed, as the contract with the city calls for the furnishing of gas by January 1. There are to be 20 coke ovens constructed on the latest plans at a cost of about \$8000 each, and the total cost of the additions which have been planned will be between \$300,000 and \$400,000. The Northwestern Fuel Company of Superior will soon start work on the 108 coke ovens to be built on the Lehigh dock besides the old ones now in use.

I learn that before long there is going to be great development in Eastern Kentucky coal lands by the Chesapeake & Ohio, up the Big Sandy particularly. Railroads

for the coal of the isolated mountains of Kentucky have long been named among the certainties of the future. At least it seems as if these commercial necessities may be counted on within a definite and reasonable time. The Southern Railroad is now credited with a scheme to build an extension from Middlesboro to Harlan Court House, following the lines of least resistance along the Cumberland River and opening the way for the great coal seams of Little and Big Black Mountains and the thinner beds of that rich region. Until recently this railroad extension has only been on the public mind. Railroads have a way of figuring things for themselves and doing them in their own good time. It seems likely now that the Southern has given this project careful consideration and has adopted a plan of action. Its men in charge of the field work have been called to several conferences with officers at headquarters within the last month or two, and persons interested in coal in the several counties through which the new railroad must pass are looking confidently for the beginning of work on the railroad within a year and for the completion of a line within the next two years.

The furnace now in course of construction at Battelle, between Birmingham and Chattanooga, on the line of the Alabama Great Southern Railroad, is rapidly nearing completion and much of the machinery is on the ground. J. G. Battelle of Columbus, Ohio, in whose honor the new little furnace town is named, is president; Erskine Ramsey of Birmingham is vice-president; J. F. Steins is secretary and treasurer; C. E. Bowron is superintendent, and J. H. Dowling of Chattanooga is blast furnace superintendent. The furnace will have four William Tod blowing engines and a capacity of 250 tons, while the battery of coke ovens will run to the 300 mark. Three hundred houses, averaging four rooms each, will be rapidly erected and the little town of Battelle will soon assume importance in the industrial world.

Within the past month there has been quite a deal of activity about the mines of the Alabama Consolidated Coal & Iron Company, located at Lewisburg, Ala. A lot of construction work is being done, a coal washer being in course of erection, while 25 houses for miners' residences will soon be built near No. 2. This mine is expected to be in full operation soon. The coke ovens being constructed by the Miner Construction Company will soon be ready for the torch.

There has been a very great deal of discussion as to the advisability of combining several of the smaller operating concerns in Alabama; this is a most desirable feature when one considers the number of firms in that State, and the overwhelming preponderance of a few; there are the Tennessee Company with 3,200,000 tons, the Sloss-Sheffield with 1,300,000 tons, the Bessemer Company with 610,000 tons, and this leaves 32 concerns for the remainder of the large output of 10,000,000 tons for that State. R. C. Middletown has the matter in charge, and the latest advices are that he is meeting with a large degree of success. Representatives of the coal companies who have been approached by Mr. Middletown do not deny that such a movement is on foot, but they are very reticent as to what point the negotiations have reached. Some of them go far enough to say that the consolidation of the companies, or at least the major part of them, would be advantageous to the commercial coal interests of the State.

There has been somewhat of an increase in the price of soft coal this year as against last. The price of soft coal to consumers during the coming year will be in the neighborhood of 75 cents per ton higher than the contract prices were in 1902. This is demonstrated by the fact that in 1902 the price f.o.b. at the mines in the Pocahontas, New River and Fairmont regions was \$1.25 per ton, while the price this year will be \$2 per ton. The price in the George's Creek region last year was \$1.25 per ton, and this year it is \$2.25 per ton, and the price of Pennsylvania coal in 1902, which was \$1.25 per ton, will this year range between \$1.75 and \$2 per ton. Owing to an excess in output there are some reductions from these figures at present. The railroads advanced the freight rates on coal on April 1 10 to 15 cents per ton from the various regions shipping to tide, and this remains as a charge against the coal no matter what the

tide or mine price is. It is believed that the trade will remain dull until the middle of July, but after that time the producers insist that there will be a state of activity during the balance of the year and that the railroads will not be able to carry enough coal to supply the demand.

There has also been an increased price had for coke, as compared with the contract prices ruling a year ago, so that one hears that furnace coke from the Connellsville and Lower Connellsville regions will be quoted at \$4 a ton during the second half of the year, but this is doubtful, and there has been very little coke sold at \$4 a ton this year, and none during the closing months of 1902. The operators, except those who were bound by contracts made during the first half of 1902, held off for the highest figure they could get. The quoted price of furnace coke at present is \$4.25 per ton, and it will not be long until it can be bought at the ovens for a less figure. Operators who contracted for the summer output at that figure are considered well off, according to the present outlook. However, prices are yet some above this figure, and while there will be a settling down to normal conditions if the railroads are able to move production out of the region and furnish empty cars each day, still prices will remain at profitable figures.

Arbitration is usually supposed to be conducted by fair minded men, but a recent case, that of the engineers in the stock yards at Chicago, shows that there are exceptions to the general rule. The engineers demanded 37½ cents per hour, but the ministers—two Protestants and one Catholic—thought that 30 cents would be the fair thing, and for arriving at this conclusion presented a modest demand of \$1000 each; this bill to be paid by the packers and engineers conjointly. Instead of being satisfied with it the engineers in their meeting turned it down promptly, and demanded to know how much time the ministers had spent in considering the proposition; this was found to be 48 hours, in 12 sessions of four hours each. A motion was thereupon made to award each arbitrator the same amount that they awarded the engineers, and promptly carried. The total, \$14.40, was ordered paid each arbitrator, the union to pay half. "What measure ye mete unto others shall be meted to you again."

In a recent press dispatch concerning the explosion of a saw mill boiler it was asserted that there was no water in the boiler at the time it gave way, for the ground all around it was perfectly dry. It is quite probable that this was the case, but if the sapient observer who noted the fact had reflected that when the pieces of the boiler were scattered far and wide the water went with them, and would not be found in pools on the surface in the immediate vicinity, he would not have been surprised at its absence.

An employee in a large works was recently stopped at the gate by the watchman because he was two minutes behind time, and was compelled to wait until an hour had passed before he could get in. He complained to his foreman of the injustice of such regulations, but was told that if a large number did the same thing, say 10 per cent. of the 2000 employees in the concern, the loss to the managers would be 400 minutes, or six and one-half hours daily, which was wholly unnecessary from any point of view and could not be considered for a moment.

The Michigan Supreme Court has ruled recently that when an author places his work in public he is held to invite criticism, and, however harsh or unfriendly the tone of such criticism may be, he has no recourse, provided there are no material misstatements and allegations in the reviews. This may apply equally to published reports of trials of machines and engines, which are sometimes decidedly adverse, particularly when promoters attempt to exploit impossible economies. One such scheme is now being pushed wherein 100 per cent. dividends are predicted, and savings of only 80 per cent. are asserted upon no basis whatever as regards the engine itself.

A Bessemer Memorial.

We are requested to announce that a representative committee has been formed for the purpose of raising a memorial to the late Sir Henry Bessemer. The phenomenal industrial development of the world in recent years is largely due to the metallurgical process which bears the name of Bessemer, and it has long been felt that his life's work should be suitably commemorated in London. The objects of the memorial are as follows: "1. The erection (and, if necessary, the endowment) of metallurgical teaching and research works in connection with the University of London, equipped for the testing of ores and metallurgical products by modern methods and for the investigation of new methods and processes.

"2. The foundation of international scholarships for post graduate courses in practical work in connection with proposals of the Institution of Mining and Metallurgy now under the consideration of the Board of Education."

The committee includes leading representatives of the metallurgical, engineering and mining industries and professions and of education authorities, the iron industry being represented by Sir Christopher Furniss, E. P. Martin and Sir Thomas Wrightson. The officers of the fund are Sir William H. Preece, chairman of the Society of Arts, chairman; Julius Wernher of Wernher, Beit & Co., and Sir Francis Mowatt, Permanent Secretary to the Treasury, trustees, and Charles McDermid, secretary of the Institution of Mining and Metallurgy, secretary. A meeting to inaugurate the fund will be held at the Mansion House on Monday, June 29 next, under the presidency of the Lord Mayor, Sir Marcus Samuel, particulars of which will be published later.

We are advised that Prof. H. M. Howe of Columbia College, New York, has been invited by the committee to represent the movement in the United States, while Lord Strathcona has been asked to nominate a representative for Canada.

It is greatly to the credit of American steel mills that they are able to roll so exactly to specifications as regards the thickness of boiler plates and sheet steel generally. While it would be improper to assert that in a lot of 100 plates there would be no variation in the weights, it is not improper to say that the dimensions are very close to demands. When it is known that the sizer vary by gauges—wire gauges—and are so close that no reasonable person could complain, that the sheets are hot, and, therefore, larger by their expansion than the finished size, it must be conceded that American steel rollers are experts.

Metallic packing does not merely serve the purpose of keeping piston and valve rods tight against leakage, but it has greatly reduced friction. Few persons are aware of the grip packing has upon a good sized rod, say one of 6 inches diameter. It was not uncommon in old times to sustain the whole weight of the piston—44 inches diameter—and its rod by simply screwing down the packing tightly. Trunk engines with trunks 15 inches diameter can be stopped to a standstill while running by setting up the packing hard. Modern steam pressures and piston rod speeds are very severe upon the composition rings in metallic packing, which burn out rapidly if the mixture of metals is not just right.

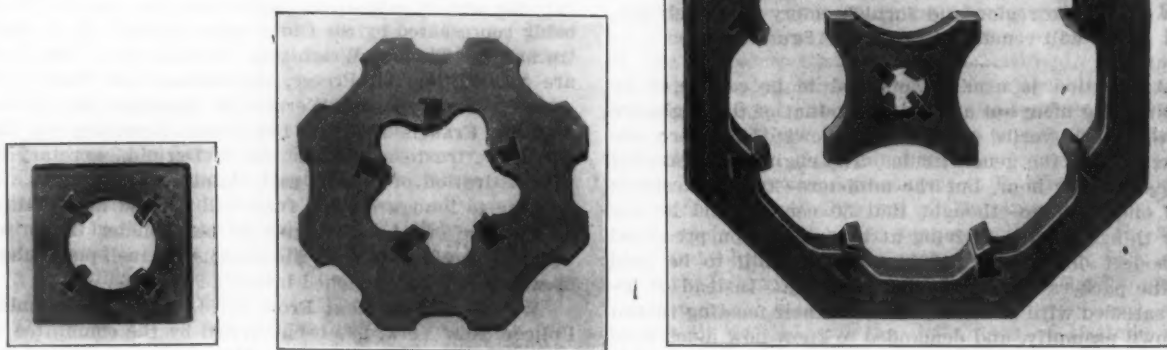
The cruiser "Colorado," building by the Wm. Cramp Ship & Engine Building Company, Philadelphia, Pa., for the United States Government, was launched successfully on the 5th ult., from the Cramp Company yards. The "Colorado" is the first vessel of the "Pennsylvania" class, of which there will be eight, to take the water, and which will be among the largest in the navy. The dimensions of the "Colorado" are: Length on low water line, 502 feet; beam, 69 feet 6 inches; draft, 24 feet 6 inches; trial displacement, 13,700 tons; coal bunker capacity, 2000 tons. The engines will be of the inverted, vertical triple expansion type, with a combined indicated

horse-power of 23,000, from which it is expected to obtain a speed of 22 knots per hour.

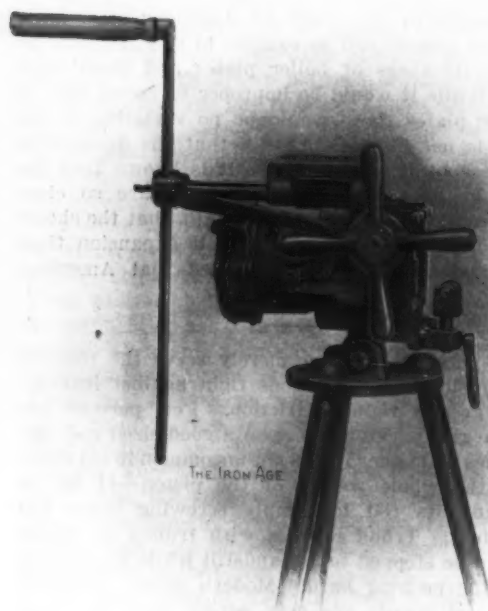
The Borden Pipe Threading Machine.

The principal characteristic of the pipe threading machine built by the Borden Company of Warren, Ohio, lies in its simplicity. In addition it is exceedingly powerful, and yet easy and rapid in its operation. The pipe enters the machine from the right, resting upon a V-shaped roller, which may be adjusted to any height to suit stock of different diameters. The jaws of the vise move in horizontal guides and their faces are serrated V's of very large angle. They are operated by a rod, threaded right and left handed, which is turned by the star wheel.

The threading die is placed in the opposite end of the machine, the recess to receive it being shaped to correspond with the outside of the die, so that no bolts are required to hold it in position. This construction insures the turning of the die with the shell containing it.



Different Forms of Cutters.



THE BORDEN PIPE THREADING MACHINE.

Longitudinal movement of the die is prevented by an outside ring which swings out of the way when the die is to be removed.

The shell carrying the die turns upon a stud of large diameter made integral with the frame of the machine. Each edge of the shell is provided with a felt washer, which prevents the entrance of dirt to the bearing. The inner end of the shell carries a large gear, engaging with a wide faced pinion operated by a crank, which may be adjusted according to the power required to thread the pipe. The elbow lever shown in front actuates a toggle, one end of which is secured to the frame and the other

end to the sleeve. This is used to force the die against the end of the pipe until the thread has been caught.

The cutters are dovetailed in the ring and are secured by pins, which are driven out when sharpening becomes necessary. It will be noticed that the working edge of each cutter is slightly above the center of the circle. This insures the removal of material by a real cutting action and not by tearing, and therefore adds to the ease of operation.

Washington Navy Yard Improvements.

WASHINGTON, D. C., May 5, 1903.—The Navy Department is making preparations for enlarging the gun foundry and machine shops at the Washington Navy Yard to

twice their present capacity, and in this development a large amount of new machinery will be required, together with boilers, pumps, engines and dynamos. The projected improvements will make the Washington Navy Yard one of the most important Government establishments in the country.

In order that the recommendations for an appropriation for this work which the Secretary of the Navy will send to Congress next December may be based upon carefully prepared data, a special board has been appointed, composed of Capt. W. M. Folger, Commander J. M. Boyer and Lient.-Com. F. F. Fletcher, with instructions to prepare detailed plans and estimates. No report has yet been made by the board, but sufficient work has been accomplished to indicate the general character of the improvements. The power plant will be entirely remodeled and very materially enlarged. In the last naval appropriation bill the sum of \$200,000 was set aside for the improvement of the gun foundry, and a portion of this sum will be available for carrying out these plans; but as the appropriation was intended chiefly for current repairs a much larger amount will be required to bring the gun foundry up to the necessary standard of efficiency.

The only department now adequately equipped is the big gun shop, the capacity of which is out of proportion to the power plant or to any of the other departments. The small gun shop, in particular, is unable to turn out more than half the work required in furnishing guns for the ships now under construction. The mount shop, in which the gun carriages are constructed, is also much too small and will be doubled in capacity. The forge shop will also be greatly enlarged and supplied with a more modern equipment than that now in use. It will be seen that because of the inadequacy of the power plant and the mount shop work on the big guns has been much less rapid than would have been the case if the equipment of these departments had been adequate, and the Government is therefore suffering a loss on the capital invested in the costly machinery for turning out and assembling 12 and 13 inch guns. The lack of balance and proportion in the general plant has also made it difficult to carry on the

work systematically, and the result is that a large number of guns, mounts and fittings of all calibers in a more or less unfinished state are jumbled together in the various shops in a manner that makes it difficult to operate the machinery. It is because of the lack of equipment at the Washington gun foundry that several contracts for small guns have recently been let to private parties, and it is not the intention of the Navy Department to follow this plan as a permanent policy.

While it is probable that guns built by the Government cost more than those furnished by private parties, it is claimed that a greater uniformity is secured, which is of much importance in view of the efforts now being made to standardize the armament and equipment of war ships of all sizes. Secretary Moody hopes that the gun foundry will be enlarged in time to supply nearly all the guns that may be needed hereafter, and it is possible that Congress may be asked to make immediately available whatever appropriation is made for this purpose; otherwise the fund could not be drawn upon prior to July 1, 1904. In any event it will probably be 18 months before the capacity of the foundry is materially increased.

W. L. C.

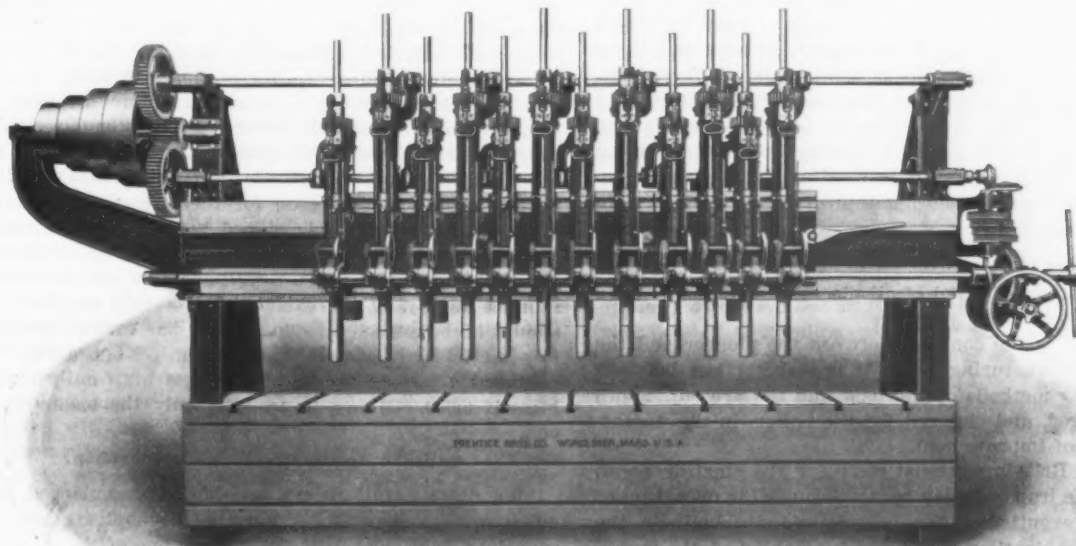
The Eastern Steel Foundry Company.

The Eastern Steel Foundry Company were recently incorporated under the laws of New Jersey, the capital

Squier Mfg. Company, manufacturers of sugar, rice and coffee machinery, agricultural implements, &c., have added to their extensive plant at Broadway and Mortimer street, that city, greatly improved facilities and equipment for the production of plantation machinery and will hereafter turn out large quantities of such machinery for sugar, rice and coffee plantations, in addition to their regular output of patent forges, blowers and ventilating apparatus. They are now filling a large order for export to the west coast of Africa. They have established sales agencies in a number of foreign countries and other similar agencies are being arranged for. Charles J. Hart, who formerly represented the Squier Mfg. Company in Spain and Portugal, sails this week for Lisbon, Portugal, where he will continue to act as sales agent for both the plantation machinery and the forge and blower departments. An agency has also been established at Puebla, Mexico, with A. Dellinger in charge.

The Prentice Twelve-Spindle Drilling Machine.

The Prentice Bros. Company of Worcester, Mass., have just completed for the American Locomotive Works a 12-spindle machine for drilling mud rings for locomotives. The heads of the machine are mounted on saddles and are independently adjustable thereon to give varying distances between the centers of the spindles. The saddles have independent lateral traverse on the cross rail, or by



THE PRENTICE TWELVE-SPINDLE DRILLING MACHINE.

stock being \$1,800,000. This company will erect a large steel casting plant at Eddystone, near Chester, Pa. The land which has been acquired is bounded by the Philadelphia, Baltimore & Western Railroad and Crum Creek, affording most excellent railroad and water transportation facilities. A main foundry building, 250 x 550 feet, and a machine shop, 113 x 250 feet, are to be erected at once. The output of the plant is estimated at 2800 tons of castings per month, running from 5 to 15,000 pounds weight of individual casting, the product being such as is used by railroads, shipyards, locomotive, machinery and engine builders, &c. The main offices of the company are to be located at Eddystone, Pa., the officers of the company being: John T. Ducher, president; A. Judson Stone, vice-president, and William H. Corbin, treasurer. Wm. T. Watson, formerly of the American Steel Castings Company, is to be general sales agent for the company. It is intended that operations on the plant are to be started at once and will be pushed to completion at the earliest possible moment.

The Buffalo Forge Company of Buffalo, N. Y., who recently acquired the entire business of the George L.

coupling them together universal traverse is obtained. When the saddles are coupled together they constitute a continuous surface, upon which the heads may be adjusted to drill holes in a line on equidistant centers. The saddles are adjustable on the cross rail by rack and pinion and ratchet lever. All the spindles may be driven simultaneously, or any one of them may be disconnected by a clutch, operated by a handle placed in front of each head. The stop motion may be set to drill holes to a given depth, and it automatically releases the feed when the spindle reaches the lowest position. The spindles are raised or lowered collectively by means of a lever; the feed is changed and hand feed and friction feed operated all at the end of the machine. Each head has an independent quick approach and return movement. There are four changes of speed and four of gear feed. The table is T-slotted to hold the work. The capacity of the machine is 12 1-inch holes in steel. The minimum distance between spindles is 5 inches, the maximum 8 inches, and the maximum distance between the outside spindles is 134 inches. The traverse of the spindles is 14 inches. The diameter of the spindles in the bearings is 2¼ inches. The distance from the floor to the top of the table is 30 inches. The maximum distance of the spindles to the

table is 16 inches. The total height of the machine is 112 inches. The distance between housings is 144 inches. The floor space occupied is 60 x 212 inches, and the weight of the tool is 18,500 pounds.

Andrew Carnegie's Presidential Address.

The Iron and Steel Institute.

At the meeting of the Iron and Steel Institute being held at London this week Andrew Carnegie delivered his inaugural address as president, from which we take the following:

Looking over the list of your presidents, their successor is struck by the value of the service they have rendered. Great names are there, among them the chief inventors and pioneers in iron and steel—Bessemer, Siemens, Bell and others, whose names are household words. There is scarcely one who has filled the office who has not been able in his inaugural address to deal with a branch of the subject as perhaps the recognized first living authority upon it. Several have announced and described in your proceedings their own inventions which made them famous. What a contrast the present occupant presents, who has no shadow of claim to rank either as inventor, chemist, investigator or mechanician. None know so well as you, fellow members, that his attention has been centered upon the business department, and that it is experience in this alone which entitles him to address you. It is the department which differs most, perhaps, from any other: at least an American humorist gives it as his opinion that the business instinct can no more be instilled in men by teachers than the homing instinct could be developed by feeding them upon pigeon pie. I invite your attention this morning, therefore, to the important question of

The Organization and Management

of that most complicated of all pieces of machinery—man—which has been my province.

Great as is the contrast between the pioneer and the modern manufacturing plant, it is scarcely less between the business methods of the past and the present. Both have changed, and changed for the better, in the unceasing march of improvement.

It is to Britain we must come for the starting point, for here the Iron Industry began through the operation of her own inventions. We note how individualistic the various organizations were which established the manufacture. No trace of the corporation is seen, for that came later. Brown, Cammell, Jesop, Frith and others were the first captains of the industry, chiefly of the mechanical rather than the commercial order, and most of them, I believe, had worked with their hands in youth. Bessemer, Siemens, Thomas and others came later. It is not strange that the inventive and mechanical should have taken precedence of the commercial element in the beginning, since upon these success primarily depended. When the joint stock form came the business element naturally took first place.

It may be doubted whether the superintendent of any works under joint stock management in these early days had a seat on the board or any reward beyond a fixed compensation, or was called to the main office for counsel upon any question not strictly mechanical. Probably there was not one foreman or important man recompensed in any form beyond fixed salary. The admission of young partners without capital was unheard of. The joint stock form does not lend itself readily to the substantial recognition of exceptional service from the exceptional man, or of payment based upon results in departments, yet it is in this direction that the most important changes have come in the business department.

Junior Partners.

Speaking from experience, we had not gone very far, in manufacturing before discovering that perfect management in every department was needed, and that this

depended upon the men in charge. Thus began the practice of interesting the young geniuses around us, as they proved their ability to achieve unusual results—the source of big dividends. These received small percentages in the firm, which were credited to them at the actual cash invested, no charge being made for good will. Upon this they were charged interest, and the surplus earned each year beyond this was credited to their account. By the terms of the agreement three-quarters of their colleagues had the right to cancel it, paying the party the sum then to his credit. This provision was meant to meet possible extreme cases of incompatibility of temper, or if the recipient should prove incapable of development, or of enduring prosperity. At death the interest reverted to the firm at its book value. The young men were not permitted to assume any financial obligation, and not until their share was fully paid by the profits, and there was no further liability upon it, was it transferred to them. Thus thoughts of possible loss never prevented concentration upon their daily duties. They were not absorbed in the daily quotations, for the shares were not upon the stock exchange or transferable. This policy resulted in making some forty odd young partners, a number which was increased at the beginning of each year.

By this plan they were rapidly paying for their interests and promising to become the millionaires of the then seemingly somewhat distant future, which, however, proved not so very distant. They are now rich men. You will not fail, however, to note that the plan kept them all in excellent training, as poor men still living upon their salaries, millionaires in *posse*, indeed, but not in *esse*—quite a difference, for millionaires seem liable to develop when still very young so many hitherto unsuspected weak spots in their constitutions requiring careful nursing, and many absences and short hours, and a dozen other impediments to hard, continuous exertion, that it does not seem good for their robust health that they should be unduly burdened before reaching middle age. The zest of the chase is over too soon. It will be found the exception when a millionaire employee strains himself unduly by overexertion in the mill or office, nor should he be expected to do so. He has earned the right to some leisure for self improvement. When a man has achieved a competence, new duties to his family and to himself arise. Money is properly only the means to an end.

Captain Jones Declines Partnership.

We did not fail to see, as the works enlarged, how much success depended upon the mechanical men, the superintendents and foremen, yet not one of these had up to that time been admitted as partner. The business and the mechanical men—office and mill—were still widely separated. Well do I remember the first attempt to bring these two departments into closer relations. It was made with our Captain Jones, one of your members, well known and appreciated by many of you as in the foremost rank of managers, perhaps the foremost of his day in America. He came to us as a working mechanic at 8 shillings per day. I explained to the Captain how several of the younger men in the business department had been made partners and were actually receiving much greater rewards than he, while his services were at least equally valuable, and informed him that we wished to make him a partner. I shall never forget his reply. "Mr. Carnegie, I am much obliged, but I know nothing about business and never wish to be troubled with it—I have plenty to trouble me here in these works. Leave me as I am and just give me a thundering salary." "Hereafter," I said, "the salary of the President of the United States is yours, Captain," and so it remained till the sad day of his death. My seniors, the presidents of the other manufacturing concerns, did not fail to take me to task for ruining the steel business by paying a mechanic more salary than any of them received. Being much the youngest of these great dignitaries, I humbly confessed my wrongdoing, not, however, failing to inquire if they knew where we could find two or three more Captain Joneses at double the price. We did not overpay the Captain; he was worth several ordinary salaried presi-

dents. The Captain's declination of partnership was the only one which ever came within my experience. None of the other mechanics ever preferred salary to partnership, and they were wise. Nothing can compare with that form. Let me impress that upon the younger members here who may soon have, or should have some day, the choice laid before them. From that time forward the union of the mechanical and business partners went steadily forward until no manager of a mill was without his interest in the business, as pertaining to the position, and no board of management, or important committee, was without a mechanical representative. Thereafter mill and office conferred upon all important sales or contracts. The mechanic and the man of affairs were in constant consultation and fellow partners—one of the most profitable changes that ever we made.

There was another step taken in the same direction. Men having others under their charge were given an interest in the proceeds, or savings in cost, in their department. Where it was impossible to decide the limits of a department, the managers were rewarded by handsome bonuses beyond their salary, based upon the general profits of the year. Thus, as a rule, every man in authority became more than a mere wage earner. He felt himself on the first step of the ladder which led to partnership sooner or later, and was worth any two mere employees paid only a daily or monthly wage and denied special recognition.

This plan of reward according to results for heads of departments has already become so general and is spreading so fast we may be sure it has proved its efficiency. There are few large department stores or important houses in retail trade which have not been forced to adopt it.

This plan is probably bound to prevail to greater or less degree in manufacturing concerns, and the sooner the better, for the greater number of the workers capital can compensate, and in one sense reward, by sharing its gains, the more harmonious and therefore more profitable for both must the relationship become.

I never see a fishing fleet set sail without pleasure, thinking this is based upon the form which is probably to prevail generally. Not a man in the boats is paid fixed wages. Each gets his share of the profits. That seems to me the ideal. It would be most interesting if we could compare the results of a fleet so manned and operated with one in which men were paid fixed wages; but I question whether such a fleet as the latter exists. From my experience I should say a crew of employees *vs.* a crew of partners would not be in the race.

The great secret of success in business of all kinds, and especially in manufacturing, where a small saving in each process means fortune, is a liberal division of profits among the men who help to make them, and the wider distribution the better. There lie latent unsuspected powers in willing men around us which only need appreciation and development to produce surprising results. Money rewards alone will not, however, insure these, for to the most sensitive and ambitious natures there must be the note of sympathy, appreciation, friendship. Genius is sensitive in all its forms, and it is unusual, not ordinary, ability that tells even in practical affairs. You must capture and keep the heart of the original and supremely able man before his brain can do its best. Indeed this law has no limits. Even the mere laborer becomes more efficient as regard for his employer grows. Hand service or head service, it is heart service that counts.

One of the chief sources of whatever success may have attended the Carnegie Steel Company was undoubtedly their policy of making numerous partners from among the ablest of their men, and interesting so many others of ability in results. I strongly recommend this plan to the members of the Institute engaged in business, believing that in these days of threatened exhausting competition it will be the concerns which adopt this plan, other things being equal, which will survive and flourish.

In no field is the wise saying more amply verified than in manufacturing. "There be those who gather, yet scatter abroad, and there be those who scatter abroad, yet put into barns."

Capital and Labor.

Disputes of some kind between capital and labor are always in evidence, but it must never be forgotten that in the wide fields of domestic service and in that of the few employees with a working master, which embrace by far the greater number of wage earners, all is, upon the whole, satisfactory; there reigns peace, with the inevitable individual exceptions.

We see in this encouraging fact the potent and salutary influence of the personal element. The employer knows his men and the men know their employer; there is mutual respect, sympathy, kindly interest and good feeling, hence peace. In the extensive field of domestic service we best see how true it is "Like master, like man; like mistress, like Nan." Here we have the relation of employer and employed in its closest form and innumerable households testify to the harmonizing effect of personal relations. The trusty servant becomes practically a member of the family, deeply attached to it, and the family reciprocates the feeling. Few householders are without old retainers and pensioners, and to the end of the days and even to that of the children of the household the relationship remains unbroken. The friendship of the employers and their children for the old servants, and the affection of these for their masters and mistresses and their children, is one of the most delightful features of life.

What has produced this reciprocal affection? Not the mere payment of stipulated wages on the one part and the bare performance of stipulated duties on the other—far from this. It is the something more done upon both sides and the knowledge each has had opportunity to gather of the other, their virtues, kindness—in short, their characters. The strict terms of the contract are drowned in the deep well of mutual regard. Labor is never fully paid by money alone.

If the managing owners and officials of great corporations could only be known to their men and, equally important, their men known to their employers, and the hearts of each exposed to the other, as well as their difficulties, we should have in that troublesome field such harmony as delights us in the domestic. It is mainly the ignorance of contending parties of each other's virtues that breeds quarrels everywhere throughout the world, between individuals, between corporations and their men—and between nations. "We only hate those we do not know" is a sound maxim which we do well ever to bear in mind.

In the progress toward more harmonious conditions between employer and employed we see that the system of payment by fixed wage has been largely supplanted by payment according to value of service rendered by workmen in positions of authority over others, and by recognition not only in money, but in position, which often counts quite as much as coin, and not seldom much more with the ablest. There remains still receiving the fixed wage the great mass of ordinary workmen; but we see in the history of the relations of employer and employed that these have not failed to rise greatly also. The movement tending to improve the position of the worker has not passed over even the humblest, but has reached and benefited all.

Passing over the day when the capitalistic employer owned and managed his labor as slaves, it is surprising to note that even as late as last century villanage still lingered in Scotland. Miners and laborers were practically transferred with the mine when it was sold. Speaking recently to a most intelligent miner in Fife (and the Fife miners deserve their extraordinary reputation for intelligence, sobriety and all the elements of good citizenship), I mentioned the fact that our forefathers were thus transferred, and contrasted the position now, when their committee was at that moment meeting the property owners in discussion as equal parties to a contract, both merchants—one buying, the other selling labor. To the inquiry what would be thought now if the employer desired to transfer the men with the mines, he replied: "Aw, there would be twa at that bargain, I'm thinkin'." You have to be Scotch fully to appreciate the reply, for much lies in the accent, the twinkle of the eye and significant nod.

The payment in merchandise of whole or part, and the obligation to perform certain duties to the employer, lingered after villanage passed away, but to-day we have reached the stage of perfect equality between the two contracting parties. Each is free to demand terms or to terminate agreements. Labor is worthy of its hire and is now paid this in coin, the law in many lands going so far as to make its claim a first charge upon the employer's property—a great advance. But the irresistible pressure which has forced change after change in the relations of capital and labor still operates unchecked—a sure indication that the final stage has not yet been reached. We have evidence of this in another important advance, the sliding scale, which provides not a fixed wage but in some degree settles by results. Increased demands bring higher prices and profits to the employer, which in turn bring workmen higher returns, so that as the employer's profits rise and fall, so do the workman's rewards. If I were asked what was the best service the Carnegie Company were ever able to render the wage earner, next to giving steady employment at wages equal to any, I should answer, by persuading them to adopt the sliding scale, with a minimum insuring living wages, at their works at Braddock 14 years ago, which has given perfect satisfaction from that day to this and is still in force, and has produced undisturbed harmony between capital and labor. The sliding scale is a great advance over the fixed wage, not only by securing the workman a prompter and more certain share of the profits, but also because it raises his status. He is something akin to a proprietor when he shares varying profits instead of having merely a fixed wage. He has risen in the scale and is more of a man, and the more of a man the better and more valuable the workman.

Gentlemen, while, as you have seen, the Carnegie Steel Company interested their young men as partners and were always anxious to reward exceptional service, and carried the bonus system to an extent, perhaps, unknown in any similar organization, the masses of the ordinary workmen could not be embraced under the limited partnership form, even if it had been thought desirable that their savings should be so invested. The objection to this from the point of view of the workman, which always arose in our minds and which we were never able to surmount, was the sad and instructive history of the largest manufacturing concerns, especially those of iron and steel.

More than once in the history of the Carnegie Steel Company leading partners have been so doubtful of their future as to beg their more optimistic senior partner to buy large amounts of their interests at actual cost.

Vicissitudes in the Iron Trade.

It is an instructive fact that the majority of the principal of these in the United States have, at some period in their career, either been in the hands of receivers, been mortgaged, reorganized, or sold by the sheriff to the great loss of their original owners. Indeed, those who have escaped financial trouble are the exceptions. The great Cambria Iron Company were twice in trouble and once sold by the sheriff; Joliet Works were also so sold; the Bethlehem Company have twice been mortgaged; the 6 per cent. first mortgage bonds of the immense Chicago Works have sold for as low as 70 per cent., and their shares at less than one-half of their par value. The Troy Iron & Steel Company have lost heavily and undergone several reorganizations. It may be said that these disasters are of the distant past, but history has a way of repeating the past which we do well to remember. The Pennsylvania Steel Company have in recent years been in the receiver's hands. Their shares, in demand at \$300 in 1881, sold in '93 as low as \$20. There was no overcapitalization in any of these companies. Only actual cash counted. Even to-day, as I write, we hear of the Consolidated Lake Superior Company being embarrassed—after investing of cash capital \$34,000,000 (£7,000,000). Their preferred shares, which recently sold for \$80 per share, are to-day quoted on the exchange at \$15.50 (£3 4s.). The common stock, last year at \$36 (£7 6s.) per share, sells to-day for \$4 (16 shillings). It is just announced that our oldest and largest shipbuild-

ing company must be reorganized, for which \$7,500,000 (£1,500,000 sterling) are needed. Their shares, which have sold above \$85, are now at \$38. The vicissitudes of the leading iron and steel concerns of Tennessee and Colorado are still in evidence. Our friends in Canada have similar experiences. Shares of their large Dominion Iron & Steel Company, which sold at \$60 last month, are quoted to-day at \$25.

Our experience in America has not been peculiar. The year before last the iron and steel works of Germany were generally in depressed condition, and their shares suffered heavily. I read a list of these losses at the time which impressed deeply. If I remember rightly, many declined one-half or more. Several important works were reported in financial trouble. Your own experience in Britain is similar. Not a few concerns, after vibrating between seasons of loss and gain, have from time to time had to be reorganized, entailing heavy losses upon shareholders. Uncertainty of results pertains not only to iron and steel, but to all forms of business operations, and is inherent in them.

Had the employees of leading American railway systems invested in their shares last year they would already have lost nearly a quarter of their savings, Pennsylvania Railroad shares having fallen \$38; New York Central, \$40; Chicago, Milwaukee & St. Paul, \$41; Illinois Central, \$42. It may be said these losses may be recovered. Quite true, but also true they may be doubled. No man can tell.

It is this ever present danger of loss to the investing workman in all fields of investment which makes the Government savings banks of Britain so great a boon, even if interest as low as 2½ per cent. only be allowed. The principal is absolutely safe, and this is the vital point, without which little genuine good to the workers can result.

It is said that of every 100 individuals who embark in a business, 95 fail. This seems incredible, but one has only to recall the number he has known who have attempted and failed to find that the percentage of failures is great indeed.

You know too well, gentlemen, how the path of iron and steel is strewn with financial loss in all countries, and that all forms of business must encounter grave risks. Scarcely a week passes without news of embarrassment or failure in the industrial world. Thus it has ever been, and ever must be, while human nature remains unchanged.

Bearing all this in mind, the thought of asking the workingman to risk his precious savings in the manufacturing or any form of business was always discarded by us as too dangerous for him. He was advised to buy a home instead and save his rent. To facilitate this, money to build a home was lent to any of the employees who had the ground clear of debt. Their savings up to \$2000 each were taken by the company and placed in a special trust fund, entirely separate from the business. Interest at 6 per cent. was allowed, to encourage the workman to save part of his earnings for old age. The funds received were lent upon mortgage on real property, generally to such workmen as wished to build homes. It was believed that this was the safest, and therefore the wisest, use of their savings which workmen could make.

The Plan of the United States Steel Corporation.

The most convincing proof of the steady march of labor to recompense more and more based upon profits, and in forms drawing capital and labor into the peaceful bonds of mutuality, is to be credited to the United States Steel Corporation, the largest of all industrial corporations, and for which they deserve unstinted praise, as proving a genuine interest in the workmen and sagacious thought for their own.

To this step I invite your earnest attention, for it may well prove of surpassing importance and mark an epoch in the history of the relations of capital and labor. It may even be looked back to as having furnished the solid foundation for the solution of most of the troublesome questions between them.

It is in this form: Twenty-five thousand of the \$100 shares of preferred 7 per cent. stock were offered to their

168,000 employees at \$82.50 per \$100 (£16.12 per £20) share, in different amounts according to their earnings, which were subscribed for twice over; nearly one-sixth of the men subscribed—one-half being salaried men. Twenty thousand more shares of stock were afterward provided, making 45,000 in all, worth about \$4,500,000 (£900,000). Monthly payments are received. Another distribution of shares is intended next year.

One valuable and praiseworthy feature is that for five years those holding their shares and still in the service are given a yearly bonus of \$5 upon their shares, and during a second five year term a bonus, amount not yet fixed, is promised. The third feature equally praiseworthy is the resolve to set apart yearly from earnings, should these exceed \$80,000,000 (say £16,000,000), 1 per cent. of the earnings, and for each \$10,000,000 (£2,000,000) of earnings an additional one-fifth of 1 per cent., for a fund to be awarded to such of their officials and men as have in the opinion of the Finance Committee best deserved it, as a reward of merit and not *pro rata*. Such is the scope of this perhaps epoch making advance which is rendered possible by the joint stock form with shares in small amounts, easily distributable among many thousands of workmen.

It will be noted that the investment is at the risk of the men. This seems a feature which we may, however, expect the corporation to change as experience is gained, as the plan is most wisely stated to be subject to future changes. In most of the States of the Union labor's precious earnings, surely the most precious of all capital, are a first charge upon property, and this I believe the only safe policy to follow. "Every workman a shareholder" would end most of the conflicts which sadden us between capital and labor. To effect this every corporation could well afford to offer to distribute part of their shares among the saving workmen, and, in case of disaster, give preference to repayment of principal as a first charge. Any desired legislation with proper safeguards could be readily obtained authorizing corporations to make savings of employees up to a certain sum for each a preferred claim, ranking before mortgage or ordinary debts or the claims of shareholders, akin to the Mechanics' Lien and the Homestead exemption laws. This seems due to the workman, who, necessarily unacquainted with business, takes his shares upon trust and becomes the beneficiary or the victim of his employers. He should be considered as an inexperienced youth in the affair; besides, he is asked to invest not solely for his own, but at least equally for the advantage of his employer. His adviser is not a disinterested party and therefore cannot be absolved from responsibility, which would, I am confident, lead the owners of the United States Steel Company to save their trusting workmen from loss through following their advice, intended to promote the mutual advantage of the company and the workers. The responsibility is not small, since the circular assures the workmen they are offered "a safer and more profitable investment than the workman could possibly find for his savings elsewhere." Much better, therefore, that legal form be given to the moral claim.

There is another point of view, the influence upon the prudent workman of distracting anxiety in regard to the absolute safety of what may be his sole provision for old age. He will see every morning the Stock Exchange quotations, for the American workman reads the papers. Only recently he would have seen the preferred stock of the United States Steel Company temporarily quoted lower than the price charged for it to him. This may mean little to the man of affairs familiar with the ups and downs of the mercurial Stock Exchange. But what must be the effect upon the uninformed workman? Of this I am well assured: the workman whose thoughts are upon the speculative surprises of the exchange will not prove desirable. Speculation is the parasite of business, feeding upon values, creating none, and is wholly incompatible with the satisfactory performance of other regular work requiring constant care and caution. The workman's investment should never be at risk, for if his thoughts are upon the Stock Exchange they cannot be upon the machinery, and machinery, like art, is a jealous mistress, brooking no rival claimant to its absorbing de-

mands. In the interest of the employer, therefore, as well as that of the workman, the savings of the latter should be secure—here, as in other respects, their interest is mutual, and hence I believe the needed change will be made by the Steel Corporation in the near future. I cannot speak too highly of this experiment nor give the Steel Corporation too much credit for making it, since it is declared to be in the experimental stage and subject to future improvement, as all new schemes should be. Its able and progressive author, Mr. Perkins, is to be heartily congratulated.

Thus we see, gentlemen, that the world moves on step by step toward better conditions. Just as the mechanical world has changed and improved, so has advanced the world of labor from the slavery of the laborer to the day of his absolute independence, and now to this day when he begins to take his proper place as the capitalist partner of his employer. We may look forward with hope to the day when it shall be the rule that the workman is partner with capital, the man of affairs giving his business experience, the workingman in the mill giving his mechanical skill to the company, both owners in the shares and so far equally interested in the success of their joint efforts, each indispensable, without whose co-operation success were impossible. It is a splendid vista along which we are permitted to gaze.

Corporation versus Partnership.

Perhaps I may be considered much too sanguine in this forecast, which no doubt will take time to realize, but as the result of my experience I am convinced that the huge combination, and even the moderate corporation, have no chance in competition with the partnership which embraces the principal officials and has adopted the system of payment by bonus or reward throughout its works. The latter may be relied upon as a rule to earn handsome dividends in times of depression, during which the former, conducted upon the old plan, will incur actual loss and perhaps land in financial embarrassment. In speaking of corporations we must not forget, however, that there are many who are corporations in name only, their management being the life work of their few owners. These rank with partnerships, having all the advantages of this form. The true corporation is that whose shares are upon the Stock Exchange and whose real owners change constantly and are often unknown even to the president and directors, while to the workmen they are mere abstractions. It is impossible to infuse through their ranks the sentiment of personal regard and loyalty in all its wonderful power. The step taken by the United States Steel Corporation is therefore no surprise to me, for I have long believed that such corporations would be compelled to adopt the best attainable substitutes for the fruitful features of the newer system, or suffer eclipse. In the sagacious policy of the United States Steel Corporation I see proof of that opinion, nor can I suggest a better form than that they have adopted, always provided the workingman shareholder be secured against loss.

In the percentage allotted by the plan to reward exceptional officials we have for the huge corporation perhaps the best substitute attainable for the magic of partnership, which nothing, however, can approach. The reward of departmental officials may readily be secured under this provision. In the bonus granted yearly upon shares held by employees we have proof of regard for them which cannot but tell, and the distribution of shares in the concern among them has an advantage which so far even no partnership has enjoyed. The latter will no doubt adopt the plan, or find some equivalent, for the workman, owning shares in absolute security, will prove much more valuable than he without such interest, and many incidental advantages will accrue to the company possessed of numerous shareholding employees who may some day see their representative welcomed to the Board of Directors. This would prove most conducive to harmony, knowledge of each other on the part of owners and workmen being the best preventive of dissatisfaction. If the investment of the workman's savings be made secure, the rapid extension of the plan seems certain and can be hailed with unalloyed satisfaction; but in its present form it is obviously incapable of general ap-

plication, since the officials of few corporations could or would incur the responsibility of inducing their workmen to invest in their shares as a security, and few corporations could or should inspire the needed confidence of labor that these are to enjoy an unbroken career of prosperity, for such has not been the history of manufacturing concerns generally, especially in our field, to which we may well apply the celebrated lines of Hudibras:

"Many are the perils that environ
The man who meddles with cold iron."

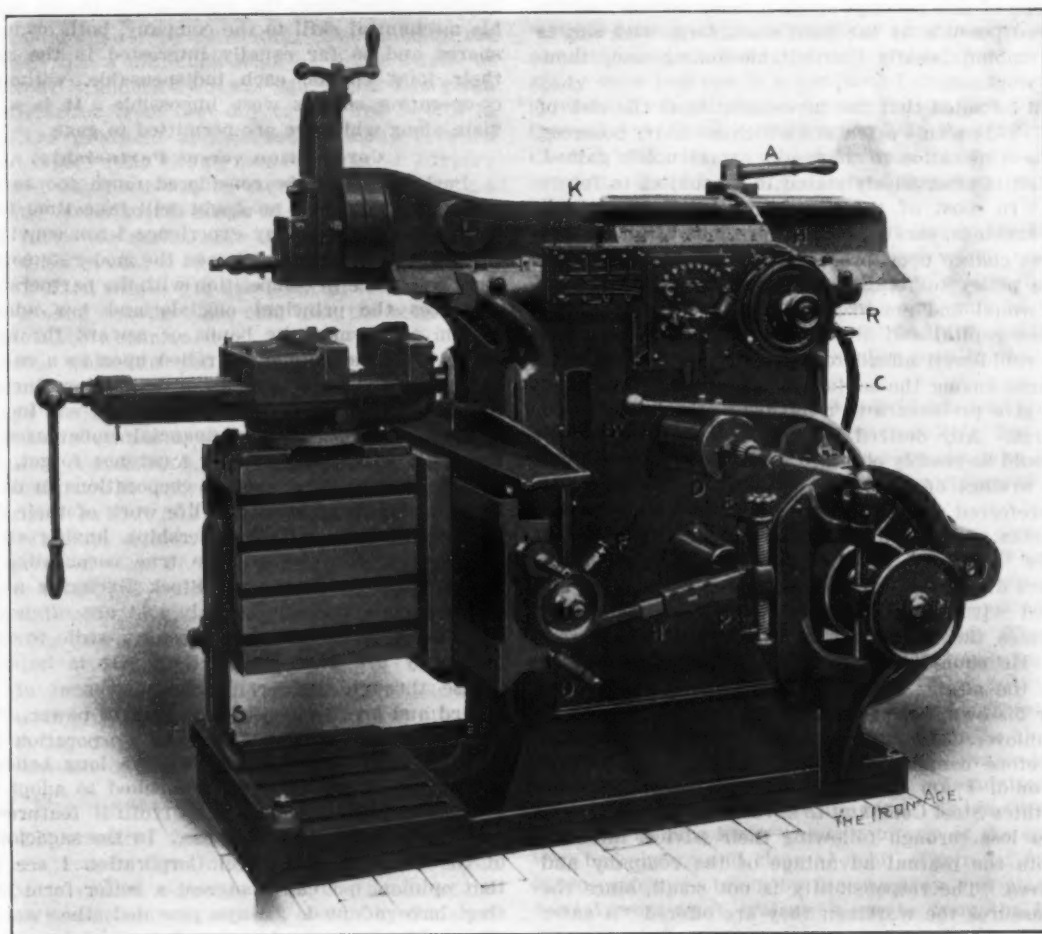
The idea of making every workman a capitalist and of sharing large percentages of the profits among those rendering exceptional service will probably encounter the opposition of the extremists on both sides, the violent revolutionist of capitalistic conditions, and the narrow, grasping employer whose creed is to purchase his labor as he does his materials, paying the price agreed upon and there an end. But this opposition will, we believe,

Association. Solomon Wile of Rochester, N. Y., explained the objects of the association, a prominent member of which is H. H. Franklin of the H. H. Franklin Mfg. Company of Syracuse.

The New Eberhardt Motor Driven Shaper.

What the manufacturers, Gould & Eberhardt of Newark, N. J., call their motor driven "double triple quick" stroke shaper, is here illustrated. This tool has a greatly increased range of speeds, and has all the operating handles brought in easy reach of the workman. There are other important details, formerly requiring intelligent hand adjustment, which are now automatic. The ram strokes can be varied from 100 per minute to 5, involving rheostat and back gear adjustments through the full range, in about ten seconds.

Beginning with the ram of this new shaper, the position fixing nut works on a finely toothed washer and



THE NEW EBERHARDT MOTOR DRIVEN SHAPER.

amount to little. It will even speak well for the new idea if scouted by the extremists and commended by the mass of men who are on neither dangerous edge, but in the middle, where usually lies wisdom.

Meanwhile, here is the germ of a promising plan offered as a solvent for one of the pressing problems of our age, which may prove capable of development. As members of the Institute let us receive, study and discuss it with open mind. That the problem will be solved, and that the two allies are some day to live in friendly co-operation, let no one doubt. Human society bears a charmed life. It is immortal and was born with the inherent power or instinct, as a law of its being, to solve all problems finally in the best form, and among these none more surely than that yexed question of our day, the relations between these Siamese Twins, which must mutually prosper or mutually decay—capital and labor.

Last week a meeting of manufacturers was held at Syracuse, N. Y., to form a branch of the Metal Trades

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seat, which avoids slip, and is also provided with an index finger reading the ram stroke in inches on the full sized scale, H. This scale enables the operator to instantly see at what length of stroke he has set the machine. The power down feed to the head is attached on the pad, L, and is regularly furnished on the 28 and 32 inch shapers, and can be attached to the smaller sizes if required. The head turns through the full circle and is graduated in degrees. The ram is heavy and long, V-section, stiffened with an internal lengthwise rib, which has been found to remedy vibration, and is confined by 45-degree angle surfaces, one side solid with the pillar casting and the other side a screw held and adjusted gibbed jaw. It has a long bearing in the frame when at extreme forward stroke. The vise has a very large range, and is provided with extra jaws for tapers and rounds; the large base revolves through the full circle, graduated in degrees, and sets on a face plate held to the top of the knee with four bolts, set as far out as possible, thus giving all available support. The vise jaw shoes are applied at

the outer ends, and the body of the vise has two T slots on top, so that odd work can be bolted down to the accurately planed vise bed, as well as held by the vise jaws. The vise is not doweled to the base or knee, but is accurately set by the graduations. The part, J, of the vise body is a hard steel casting made and set in the sand mold for the gray iron body, and welded thereto by "burning" on when the body is poured, thus providing a hard part of the body, which can be hammered without harm. This prevents inaccurate work from bruising the scraped ways of the vise. Centers are fitted to the top of the vise jaws, thus making a very complete implement, having great range and stability.

The pillar extension is an added base member of substantial depth, reaching out in front, planed on top and T slotted. To this extension the knee support track T is bolted. This gives the knee the full outboard support of the base extension and increases the knee stiffness and reduces the wear on the cross rail dovetail, thus improving the pillar and knee shaper design in its two weakest points. The knee rail is held to the frame of the machine by top and bottom clamp bolts on each side, and in addition has two permanently adjusted spring washer bolts, one near the top on each side, which hold the rail close up to the pillar face when the clamping bolts are released, and so prevent any chips or dirt dropping in between the vertical rail and pillar faces. The knee elevating screw is operated by the shaft O at the right end of the cross rail by the feed screw crank handle, which fits both. The knee feed is by an eccentric groove in the side of the variable ram crank gear, which oscillates the outside double end rocker fork, P, carrying a double thread screw, having the hand feed adjusting knob, E, at the top end; the pawl rod, N, is jointed to the feed adjusting screw nut, and a scale on the side of P shows the number of ratchet teeth covered by the pawl movement. The pawl rod N automatically adjusts itself to the different lengths demanded by different cross rail heights by means of two stop studs, which limit the pawl arm travel each way, and by a screw adjusted leather faced friction slip device formed in the body of the rod, N. The workman simply raises or lowers the knee rail at will; the pawl rod length takes care of itself, lengthening or shortening in the friction slip as may be required. The friction is enough to drive the cross feed, but will yield if the knee is carelessly fed to the cross rail limit without damage to anything. The feed pawl is of the lifting and turning variety, and has its round lifting head flattened on the driving direction side, so that the workman's fingers tell him how he has adjusted the pawl without stopping to look at it. The pawl ratchet carries a spur gear, which drives the feed screw pinion, so that wide feeds may be had, and different gears and pinions are used to give fine or coarse down and cross feed as may be required. The ram drive is by a slotted vertical lever with a sliding block and screw adjusted crank wrist secured by the nut, D, which is both hand and wrench tightened, so that the crank wrist shifting handle may be applied, and both hand and wrench nut tightening may be done without stopping the ram. The workman is thus enable to vary both ram stroke and ram position without stopping anything, and hence with the least possible loss of time and with absolute certainty by observing the index.

The electric driven shapers are made for both constant and variable speed motors. The constant speed motor requires a four-step cone on the armature shaft corresponding to the cone on the shaper for obtaining the variations in speed, which, together with the back gears, give eight speeds. The illustration shows a variable speed motor, with a rawhide pinion on the armature shaft, friction clutch, B, from spur gear to crank gear pinion shaft, which has a sliding back gear speed change, by the handle C. To make the back gear change, the pinion shaft is unclutched by a single movement of the clutch lever, B, which has a brake attachment enabling the operator to stop the machine instantly at any part of the stroke. The motor shown in the illustration is wound for any single voltage, direct current. The economy of an equipment where it is possible to obtain electrical variations in speed, with a single voltage, becomes ap-

parent when the increased cost of installation of a multiple voltage system is taken into consideration.

In case of a constant speed motor being employed with the four-step cone, making eight changes with the back gear, the Eberhardt stroke and cone scale are applied, so that the workman is always informed as to the proper step on the cone for a desired ram stroke. The belt driven shaper cones are carried on stationary sleeves, the sleeves taking the belt strain, thus relieving the pinion shaft of all save the actual gear driving load.

The variable speed motor is started by the knife switch, K, and its speed is controlled by the rheostat knob, R, and by the back gear change had through the lever C. The hand wheel G on the outer end of the pinion shaft gives a very convenient hand movement of the ram, either way, as may be desired by the workman in setting the tool. All shafts run in cylindrical bushes, held in bored seats in the frame, and can be cheaply renewed without change of original alignment. The pillar is ribbed inside and the whole machine has all the metal everywhere that can be used to advantage for solidity and stiffness.

Metallic Tubing and Tube Furniture in Germany.

In reply to the inquiry of an Illinois firm Consul-General F. H. Mason writes from Berlin:

The manufacture of tubes and pipes from iron, steel, copper, and other metals and alloys, although of comparatively recent date, is one of the most extensive and highly developed industries of its class in Germany. There were in operation at the close of 1900 77 manufacturing establishments of metallic tubing, some of which—as, for example, *Piedboeuf et Cie.*, the *Mannesröhrenwerke* and the *Röhrenindustrie*, all at Düsseldorf—are large establishments with ample resources and equipped with every facility for cheap production on a large scale.

The Mannesmann process for rolling seamless tubes and the Ehrhardt system by which seamless pipes are drawn by forcing a mandrel under hydraulic pressure through a block of metal are both German inventions which have been developed and worked with notable success in this country, while Larson's Swedish process for making steel tubes, the Murphy process, and the Robertson and Elmore patents for making copper and brass tubes are all employed here under the most advantageous circumstances.

The import duty on wrought iron and steel tubing is 5 marks (\$1.19) per 100 kg. (220 pounds) under the tariff law of January, 1896, now in force, and this rate is advanced in the tariff of December 25, 1902, to 8 marks (\$1.90) for rough and 15 marks (\$3.57) per 100 kg. for polished or otherwise finished tubing. If the wall of the finished tube is less than 2 mm. in thickness, the rate under the new tariff will be advanced to 20 marks (\$4.76) per 100 kg.

Germany has both an import and export trade in metallic tubing. The imports in that class during the 11 months ended November 30, 1902, amounted to 9916 tons, of which 6396 tons, or about two-thirds of the whole amount, came from the United States, the remaining third being derived from Sweden, Austria, Great Britain and Belgium. To what special grade, size or category these imported tubes belonged, or why they should have been imported in face of the vast home production and large export of German made tubing can only be conjectured; there is nothing in the official statistics to explain it. But during the same 11 months of 1902 Germany exported iron and steel tubing to the amount of 50,505 tons—more than five times the imports in the same class—which were distributed to nearly every country of Europe and South America, the principal purchasers being:

	Tons.
Switzerland	8,382
Holland	7,382
Belgium	6,144
Russia	2,007
Mexico	1,618
Brazil	1,013

Among the various uses to which iron, steel and brass

tubing are applied in Germany one of the most modern and important is the manufacture of furniture—especially bedsteads, cot frames and tables for household, hospital and military purposes. German science has long been in the front line of discovery and progress in all that relates to sanitary practice, the war against the myriad bacilli of human disease. Tubular metallic bedsteads are not only cheaper, lighter and more easily flexible than those made of wood, but they offer no harbor for vermin and lend themselves readily and without injury to disinfection and all the processes of sanitation. For these reasons and because they are cheap, light and serviceable, the manufacture of tubular bedsteads and other articles of furniture, which began in England and was adopted in Germany hardly a dozen years ago, now employs capital estimated at 15,000,000 marks (\$3,570,000) and from 50,000 to 60,000 operatives. As the industry has developed there has been a steady progress in the effectiveness of the machinery employed for shaping, cutting and jointing the parts; soldered joints have given place to screw connections, detachable when desired.

Bedsteads are made either wholly of iron and steel tubing, of the same tipped and decorated with brass and nicked mountings, or wholly of brass tubing, the latter class being, of course, the most decorative and expensive and adapted to luxurious households, hotels and private sanitarium. When intended for hospitals iron bedsteads are covered with a water proof varnish, which protects them from oxidation or injury in cleaning or disinfection.

The manufacture of metallic tube furniture is distributed over most of Westphalia and the Upper Rhine provinces of Germany, and there are two large and prosperous establishments in Berlin. Each of these manufactories turns out bedsteads, cots, military stretchers, &c., besides washstands, toilets, children's cots, &c., in hundreds of different models and forms, adapted to every location and purse. So cheap are the materials and processes of manufacture that the catalogue prices for the different classes of bedsteads range as follows:

Single iron bedstead:	
With plain iron fittings.....	\$1.19 to \$3.50
With spiral spring mattress.....	2.38 to 6.00
Iron bedsteads with bronze ornaments and steel spring mattress.....	6.00 to 24.00
Brass bedsteads with steel wire mattress.....	24.00 to 95.00

It would hardly seem probable that an industry so widely and fully developed, protected by the costs of transportation and even by a moderate tariff, would leave an import market in Germany for any except the higher and more costly grade of brass furniture, which the English exporters were first to discover and utilize, but which has since been almost wholly recovered by the native German manufacturers.

Iron Ore in New Jersey.

The report of the State Geologist of New Jersey gives the production of iron ore from the mines of that State in 1902 at 443,728 long tons, against 401,151 tons in 1901; an increase of 42,577 tons, or 10.6 per cent. The report says that this result is the more satisfactory, since the shortage of anthracite during the closing months of the year tended to retard the work of blast furnaces, as well as to hinder the working of the mines themselves. Inasmuch as the greater part of the ore mined in the State goes at once to furnaces under the same management as the mines, any falling off in their product is immediately felt at the mines.

Apart from the increased production for 1902 a noteworthy feature of the year's work is the favorable development at the Basic Iron Ore Company's mine, near Oxford Furnace, where a large body of soft magnetite, carrying about 5 per cent. manganese, has been found. The largely increased production of the Hibernia mines, due chiefly to the extensive series of improvements instituted several years ago and still in progress, is also worthy of mention. The work of the magnetic sorter or clobber at No. 11 shaft, Hibernia, has proven so satisfactory and economical that a similar plant is being established at No. 9 shaft.

During the year the following mines were in opera-

tion, but not all of them continuously: At Oxford furnace, Slope No. 3 (now known as the McKinley), the Washington and the Basic Iron Ore Company; at Stanhope, the Hude; at Hurdstown, the Hurd; at Weldon, the Weldon; at Port Oram, the Irondale group; at Mount Pleasant, the Richard; at Mount Hope, the Washington, Elizabeth and Teabo; at Hibernia, the Andover, De Camp, Upper Wood, Wharton and Beach Glen; at Ringwood, the Ringwood group.

Lake Iron Ore Matters.

Ore Shipments Below Last Year.

DULUTH, MINN., May 3, 1903.—Shipments of ore from all lake ports for April have been somewhat above late expectations, though not up to last year. Some of the roads, notably those at the head of Lake Superior, have come very close to their 1902 records and are pushing to beat them as soon as possible; but others, notably those that have been troubled by lack of sufficient dock room, have fallen much behind. The new docks of the Wisconsin Central, Northwestern and Great Northern are about ready and will be in use some time during the present month. Sales have not been large, considering the amount of ore needed and the number of mining companies now in the field to sell. Indeed, sales have been quite slow most of the time. Boats are not yet moving smoothly, there being a notable bunching of ships at either end, and it will be some time before the full fleet is in motion. There is an immense amount of coal coming up, and this will have its effect on the ore tonnage market and on dock room. Receipts of coal at Duluth just now are varying from 25,000 to 40,000 tons a day. This is making the stevedores very independent and is keeping the roads busy for cars and motive power, for much of this coal is moved to the interior at once. Ore dock managers have been sitting up nights of late to prevent open disturbance at their terminals, and it is not at all sure they can keep the peace.

Sinking a Shaft Through Quicksand.

Near Chisholm, on the Mesaba range, a shaft is being sunk for the Minnesota Iron Company through a considerable thickness of swamp, ooze and quicksand. The patented method of Captain Hoar of Negaunee is being tried and so far seems to be proving successful. Two heavy sets or two shaft frames, cased on the outer side with steel, are started and outside of them long steel lined lath are sunk downward. These fit reasonably tight and can be driven and jacked down independently of each other, so that when obstructions are met they may be surrounded. The sand and other material inside these lath are taken out and the sets within are driven down, when the process is repeated to the bottom. This shaft has been sunk about 2 feet a day and seems to prove the practicability of the process. It will be tried elsewhere. The ledge at the point where the shaft is being sunk is down about 90 feet.

A New Menominee Range Railroad.

The construction of extension of the Wisconsin & Michigan Railroad, reaching into the Menominee range and to Lake Michigan, will give another active competitor for the ore traffic of that district. Until a couple of years ago the Chicago & Northwestern road had this business all to itself, and then the Chicago, Milwaukee & S. Paul decided to attempt a division, which it very successfully accomplished, making a large inroad on the Northwestern last year. The Milwaukee and the Wisconsin & Michigan had interdependent relations, the latter using trackage from the former, but this arrangement is now annulled. The new road will probably build to the lake at Marinette and erect terminals and ore docks there on a large scale. It will also build along the Menominee range to Quinnesec and beyond. There is much activity in the construction of railway lines through the ore regions.

The plans of the Great Northern in Northern Minnesota for double tracking new main lines around the ore bearing region at Hibbing and a western extension have been outlined. The road is also building spurs of more or less length into mining locations and camps. The

Duluth, Missabe & Northern is removing the main line of its Hibbing extension and will run in several long branches to mines and elsewhere. The Duluth & Iron Range is expected at any time to announce the construction of a new line to the eastern Vermillion, reaching the big mines at Ely by a cut off from near the Mesaba junction point. All the roads are building long sidings and preparing for more traffic than they had in any year past, though they do not say that they have any expectation of beating last year's record. The three Minnesota roads are receiving some 1400 50-ton steel cars they ordered last fall. These are very fine cars, one new feature being the side dumping arrangement, by which both sides of the cars can be dumped from a single point on either side of the track.

A New Town at Norway.

The Aragon mine, owned by the United States Steel Corporation, has done a most commendable thing in connection with the settlement of ground about the mine, which has been under way for some little time, and now threatens to undermine the town of Norway and make it a dangerous place for residence. The company have platted an addition on safe ground and are selling building lots therein, restricted to those who will build a certain class of stores and residences, under strict regulations as to fire, &c. The ground is being sold at low prices and the new town is to be improved by water and sewers, cement sidewalks throughout, wires in the alleys, free hotel site and town hall given by the company, &c., so that the new Norway will be one of the most attractive and substantial towns in the mining region. A transfer of the entire business part of Norway to the new site will be made.

The Zenith Furnace Company, now mining south of the old Cincinnati location at Biwabik, have started a shaft 1 mile west of the same village and are to open about 150,000 tons of good ore they have found there. This is the smallest deposit of ore ever opened into on the Mesaba range and is an evidence of the thorough manner in which work is now done, as well as of the difference in ideas of what constitutes an ore body from those that prevailed a few years ago. The company have abandoned most of the work under way during the past winter east of the Mesaba station of the Duluth & Iron Range road, having found little ore.

Three shovels are in ore at the Mahoning mine and are loading 5000 to 6000 tons a shift. At most of the open pit mines the shovels are idle, on account of a dispute over wages of cranemen and runners, and the product is smaller than it will soon be. A leading earth contracting firm precipitated the difficulty by making season contracts with their shovel runners at higher prices than had been paid and with a promise of a bonus at the close of the season.

D. E. W.

Jones & Laughlin Steel Company.—The Jones & Laughlin Steel Company, Pittsburgh, have nearly completed plans for the first of the additions announced some time ago as likely to be made. Two additional furnaces, known as Eliza Nos. 5 and 6, will be erected, plans for the first of the two being now well under way. It will be somewhat smaller than the present four, and will probably have a capacity of about 450 tons daily. Particular attention will be paid to designing the furnace to use Mesaba ore. Four Talbot open hearth furnaces will ultimately be erected, two being built at a time, and work on the first two will be started shortly. They will not be built on as elaborate a scale as the first furnace, and will have an output of about 200 tons each daily. The new blooming mill, put in operation a few weeks ago, is doing nicely and gradually working up to its rated capacity. No. 11 mill, which rolls small beams and channels, as well as angles from 6 x 6 down to 4 x 4, will be moved and rebuilt on ground recently purchased. Two engines will be used to run it instead of one, by which the output is expected to be increased by nearly one-half.

The United Gas Improvement Company of Philadelphia will issue 169,500 new shares of stock to raise \$8,475,000 for extending their plants and equipment.

The Shipbuilders' Settlement in New York.

On April 30, as the result of a conference lasting continuously from 10 o'clock in the forenoon until the following morning at 5 o'clock, there was effected a settlement between the Brotherhood of Boiler Makers and Iron Ship Builders and the New York Metal Trades Association.

The original demands of the men were as follows:

1. That eight hours shall constitute a day's work on all work outside of shop.
 2. That nine hours shall constitute a day's work on all shop work.
 3. That eight hours shall constitute a day's work on all work Saturdays, except the months of June, July, August and September, when half-holidays will be in effect.
 4. That 40 cents per hour be the minimum rate of wages for an eight-hour day for boiler makers, riveters, chippers and caulkers.
 5. That 45 cents per hour be the minimum rate of wages for an eight-hour day for fitters-up.
 6. That 35½ cents per hour be the minimum rate of wages for a nine-hour day for boiler makers, riveters, chippers and caulkers.
 7. That 40 cents per hour be the minimum rate of wages for a nine-hour day for fitters-up.
 8. That 45 cents per hour be the minimum rate of wages for a nine-hour day for flange turners, angle iron smiths and furnacemen.
- OVERTIME.**—That all overtime worked inside or outside of shops shall be paid for on the basis of 2½ hours for each and every hour worked.
9. That two hours for one be demanded for every hour worked during the Saturday half-holiday, from 12 m. to 4 p.m.
 10. That employees hired at or sent out from shops to jobs shall receive car fare or necessary expenses to and from said jobs.
 11. None but members of the Brotherhood of Boiler Makers and Iron Ship Builders of America to be employed.

N. B.—In the event of a change in this agreement by either party, three (3) months' notice shall be given.

Sympathetic strikes will not be a violation of this contract. That business agent shall have access to all shops and jobs when necessary.

That all overtime be abolished as much as possible.

The agreement finally reached is as follows:

MEMORANDUM OF AGREEMENT made this 1st day of May, 1903, between the New York Metal Trades Association, represented by Wallace Downey, N. F. Palmer, Andrew Fletcher, Jr., Christopher Cunningham and George Fox, and District Lodge No. 2 of the Seaboard of the Brotherhood of Boiler Makers and Iron Ship Builders of America, represented by T. R. Foy, W. F. Cochran, J. Kay, J. Woodside and T. R. Devlin, and F. J. McKay and D. A. Malloy.

WITNESSETH, That the custom prevailing in regard to hours of work in the several plants of the members of the New York Metal Trades Association shall be continued.

That boiler makers, riveters, chippers and caulkers shall receive \$3 per day, and flange turners, anglesmiths, layers-out and fitters-up shall receive five per cent. advance.

That all overtime remain as at present, and overtime shall be dispensed with as far as possible.

Only straight time will be allowed for time worked on Saturday afternoon; but a half-holiday on Saturday afternoon without pay may be granted by arrangement between the employer and workmen.

When any workman is discharged or laid off, he shall be paid without unreasonable delay.

When a workman leaves the service of an employer of his own accord he will receive the pay due him at the next regular pay day.

There shall be no restriction or discrimination on the part of workmen as to the handling of any materials entering into the construction of the work upon which they are employed.

There shall be no limitation placed upon the amount of work to be performed by any workman during working hours.

There shall be no restriction as to the use of machinery or tools, or as to the number of men employed in the operation of the same.

There shall be no restriction whatever as to the employment of foreman.

There shall be no sympathetic strikes called on account of trades disputes.

No person other than those authorized by the employer shall interfere with workmen during working hours.

The employer may employ or discharge, through his representative, any workman as he may see fit; but no workman is to be discriminated against on account of his connection with a labor organization.

Necessary car fare and ferrage shall be paid to workmen when they are sent from plants to jobs.

In cases where misunderstanding or disputes arise between the employer and workmen the matter in question shall be submitted to arbitration without strikes, lockouts or the stoppage of work pending the decision of the arbitration.

Each member of the New York Metal Trades Association affected by this agreement shall be held individually only for the performance of the same, and his or its violation of this agree-

ment shall subject such member to expulsion from the association.

The above rules and regulations to continue for one year from May 1, 1903.

In consideration of the strike at the yard of the Townsend-Downey Shipbuilding Company being declared off immediately, this company agrees to conform to the hours of work prevailing in other yards of the members of the New York Metal Trades Association.

In witness whereof the parties to this agreement have signed the same in duplicate the day and year first above written.

It will be observed that the document finally signed is very different from that submitted originally by the men. One very notable point is that the demand for unionizing the works, which was vigorously urged, was withdrawn, and that a paragraph was accepted giving the employer the right to employ or discharge. The employers objected to giving the business agent the right of access to the plant, and won on that point also. The employers won a victory, too, in passing a series of important provisions like those relating to restriction or discrimination as to handling materials, the limitation

the new shops are ready to operate. Brass and iron goods are manufactured for steam, water and gas and pipe machines and tools.

An Improvement in Reversing Valves.

Poetter & Co. of Dortmund contribute to *Stahl und Eisen* a description of a new shut off valve to be used in connection with the reversing valves of open hearth and heating furnaces. The simple construction of the same is plainly shown in Figs. 1 and 2, and it will be seen that by a single movement of the lever the gas is cut off before reversing begins and put on again when the operation is completed. A calculation of the loss entailed by ordinary reversing valves is appended and here reproduced.

A 15-ton furnace makes in 24 hours about 70 tons, burning 20 gross tons of coal. Figuring that the valves are reversed seven times an hour, each operation taking ten seconds, 28 minutes are used up every 24 hours. Dur-

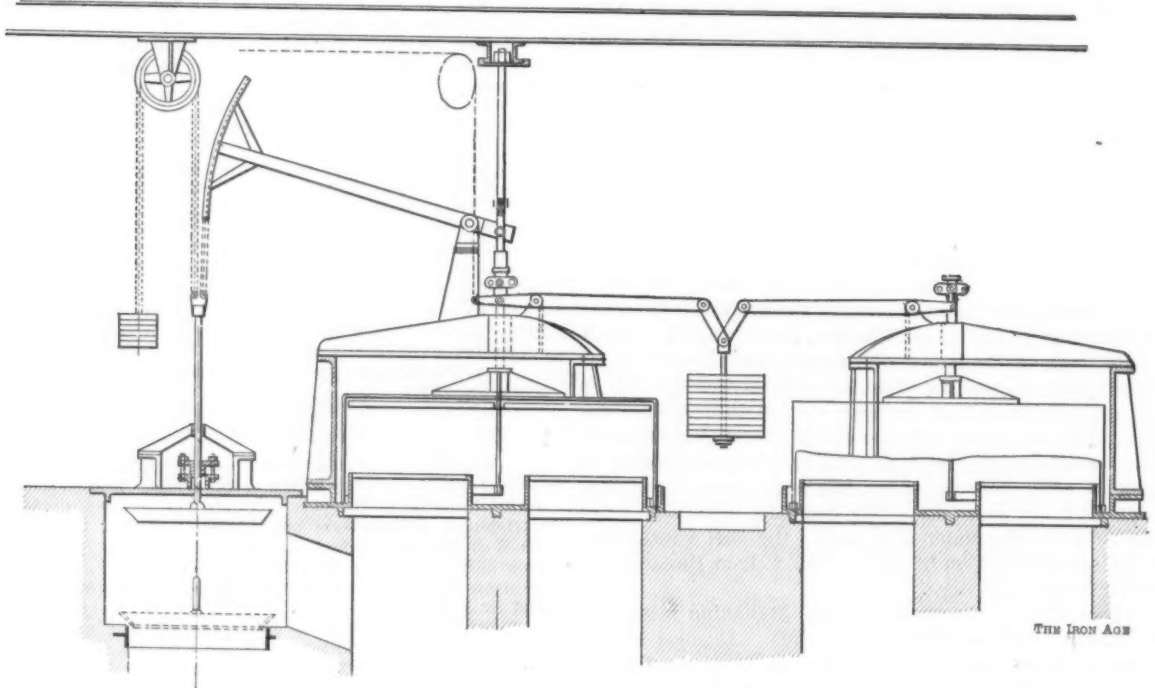


Fig. 1.—Combination of Gas Cut Off Valve and Bell Valve.

AN IMPROVEMENT IN REVERSING VALVES.

upon the amount of work, and as to the number of men employed in the operation of machinery.

The Eaton, Cole & Burnham Company.—The Eaton, Cole & Burnham Company of Bridgeport, Conn., are to build large shops on the property where is already located their new iron foundry. Plans and specifications are prepared and the new buildings will be erected this season, unless the building trades unions should make it an impossibility. There will be four large buildings. Two of them will each be 80 x 352 feet on the ground and two stories high. In them will be located the machine shops for the company's iron department. The two other new buildings will each be 112 x 320 feet and three stories high. One of these buildings will be for rough storage purposes. The other will contain pattern shop, department for cleaning castings and additional store-room. The plant will be on the water front, where the company own 42 acres of land, most of it recently purchased. A spur track, permission to build which was recently granted by the Connecticut Legislature, will provide railroad shipping facilities. The company will largely increase their machine shops. The iron department will occupy the entire new plant, while the present plant, excepting the foundry on the new site, will be given over to the brass department. The company employ about 1200 men, and the number will be largely increased when

ing this time, there being direct connection between gas inlet and stack, there is no resistance and it may safely be assumed that in these 28 minutes as much gas is lost as in a whole hour of work, so that, with a furnace of the size mentioned, there are burned unnecessarily every 24 hours $\frac{44,800}{24} = 1866$ pounds of coal, which would

be saved by the adoption of the valve described.

Practical results confirming the above calculation were obtained at a small works, the name of which is not given. The plant in question ran two furnaces in 1900 and only one in 1901, and the percentage of coal rose from 44 per cent. in the former year to 54 per cent. in the first four months of the latter. In May the new valves were installed and the amount of coal sank to an average of 37.66 per cent. for six months, although during this period both the coal burnt and the scrap melted were of inferior quality to that used before.

The enormous loss of gas during the operation of reversing is explained by the following observation: The gas pressure in the flues on the producer side of the valve when the latter is closed is equivalent to 4 to 8 inches of water, while when the gas flue is in direct connection with the stack the pressure rises to from 20 to 24 inches. A further advantage is that the reversing valves last longer, owing to the fact that gas is no longer

burnt in contact with the same, the same being true of the stacks.

In the following number of the German magazine Herr A. Wuertenberger writes to the effect that by using the old form of Siemens butterfly valve the time taken to reverse is not more than one or two seconds and the new valve rigging is unnecessary. Further, that butterfly valves have been discredited chiefly through faulty construction. Regarding the injury to the valves, he claims that the same is principally caused by the gas which had already passed the valve being drawn back from the regenerators and flues at the moment of reversing and burnt under the valve by means of the heated air from the same source. The amount of this gas is very considerable. He makes the further point in favor of the butterfly as compared with the "bell" type that, owing to the rapidity of the reverse, a proportionately less amount of cold air is drawn through the furnace.

Poetter & Co. reply to the above by saying that in modern steel works butterfly valves are no longer used for the reason that it is impossible to keep them tight.

Long Scale Voltmeter and Ammeter.

The Westinghouse Electric Mfg. Company of Pittsburgh are placing on the market a new and improved form of voltmeter and ammeter, which are, in operation, closely allied to the integrating wattmeter made by the same company. The scales begin at zero and the divisions are uniform above 20 per cent. of the full capacity, with a length and openness not found in any other type, allowing the readings to be made with perfect accuracy. As an additional aid to easy and correct reading from a distance the dial is made of translucent material, illuminated from the rear, while the markings are distinct and the figures large and prominent. The lamps for illuminating this scale are inclosed in a compartment separate from the rest of the mechanism, making perfect ventilation and not heating the working parts. In this type an electro-magnet produces a shifting magnetic field, in the air gap of which is an aluminum disk in which currents are induced by the field, resulting in the disk's movement.

This motion being opposed by a spring, the amount of

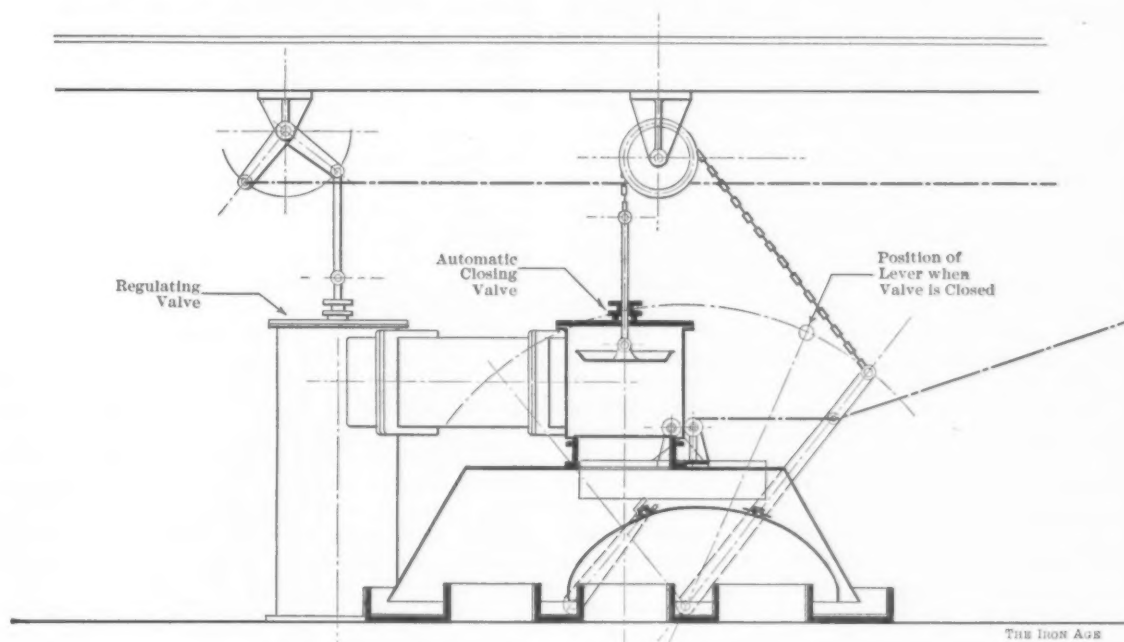


Fig 2.—Combination of Gas Cut Off Valve and Forster Valve

AN IMPROVEMENT IN REVERSING VALVES.

As to the greater cooling off of the furnace, owing to the longer time taken to reverse, they claim (and we think rightly) that air is not drawn through the furnace during this operation, as the air inlet is directly connected with the stack. In answer to Herr. Wuertenberger's other calculations, they point to the favorable practical results obtained.

It has been known for many years that alkalies are preventive of rust on iron. Freshly planed surfaces are slushed with a strong sal soda solution while on the floor, and after this dries off a coating is left which keeps the iron bright for any length of time. In tearing down some steel buildings it was found that the surfaces of details which had been imbedded in cement were not rusted in the least, and, taking a hint from this, some one painted members which were exposed to decay with a cement coating; it was found to serve the purpose excellently. Not all cements, however, answer equally well, those having iron salts in them being useless as preventives of rust.

The Cayuga Lake Cement Company of Ithaca, N. Y., have established a branch at Buffalo, N. Y., under the name of the Eastern Supply Company, and will have a supply depot at that point for the handling and distribution of their output for the building and paving trade.

deflection is shown by a pointer mounted on the shaft of the disk. When the pointer is at the zero position, the outline of the disk being spiral, the air gap closes that portion of the disk having the longest radius. As the deflections increase the inclosed radii decrease, diminishing the pull on the disk until it becomes proportional directly to the current, resulting in a uniform scale of a length obtained in no other type.

These instruments are absolutely unaffected by external fields, are totally dead beat and are compensated for changes in temperature and frequency. The moving elements being very light in weight, the bearings perfect, finely ground jewels and the shaft carefully hardened and polished, renders friction a negligible quantity. The parts are interchangeable and the cases dust proof and of neat appearance.

Instead of requiring the main current to be brought to the instrument, necessitating in some cases expensive bus-bar connections, this make of ammeter is arranged to operate from 5 ampere secondaries of series transformers, thus enabling the instrument to be mounted at any convenient point.

The Allis-Chalmers Company, Chicago, Ill., announce the removal of their general offices to the fourteenth floor of the New York Life Building, La Salle and Monroe streets.

The Union Engineering Building.

Mr. Carnegie Offers \$1,000,000.

During the past week there have become public the details of a very important enterprise to the engineering profession, with which Andrew Carnegie has associated himself.

For many years it has been the dream of engineers to bring about a closer union between the different branches by the establishment of a common headquarters in the city of New York. The conditions were such, however, that the plans discussed never led to any result, and finally the same objects were to some extent attained through the establishment of the Engineers' Club, a purely social organization consisting of engineers of all branches. This club prospered and reached its limit of membership of 1000 during the past year. It was forced to face the question of more ample accommodations, and a number of plans were considered to erect a suitable building. These culminated finally in the formation of the Engineers' Realty Company, to which there was subscribed \$117,000. This corporation recently purchased property on the south side of Fortieth street, about 420 feet west of Fifth avenue, New York, the lot being 50 feet wide by nearly 100 feet deep, and facing the new library building now being erected for the New York Public Library.

During the past year the rapid growth of the American Society of Electrical Engineers suggested the erection of a building for that body, but it was found somewhat difficult to provide for the financing thereof. At a dinner of the society held on February 9, T. C. Martin, editor of the *Electrical World and Engineer*, discussed the matter with Andrew Carnegie, who was the guest of honor, and the subject of headquarters for the engineering societies was alluded to also by Charles F. Scott, president of the Electrical Engineers, and other speakers. On February 10 Mr. Carnegie sent a message to Charles F. Scott and Calvin W. Rice, a member of the Electrical Engineers, requesting that they call upon him. In the interview the scheme of a union engineering building was first broached to Mr. Carnegie, the plan being to put up an adequate structure to accommodate the national engineers' societies, to provide headquarters and meeting places for other engineering bodies, to gather the technical libraries of the different societies in one building and to provide for the Engineers' Club.

An informal meeting of the representatives of the different societies, called by Charles F. Scott and Calvin W. Rice, was at once held, and the following committee was appointed: John Fritz of Bethlehem; John Thomson, past president of the Engineers' Club; John C. Kafer, president of the Engineers' Club; William A. Redding, chairman of the House Committee of the Engineers' Club; Charles F. Scott and Calvin W. Rice. These gentlemen had a conference with Mr. Carnegie on February 14, and received the following letter from him:

"It will give me great pleasure to give, say, \$1,000,000 to erect a suitable union building for you all, as the same may be needed."

On April 13 R. A. Franks, Mr. Carnegie's treasurer and financial agent, advised Mr. Kafer that Mr. Carnegie had authorized him to pay for options on property for the new engineering building, and also to furnish the funds for the purchase of property to be used for the site for the building. With this authorization in hand options were secured on five properties, 23, 25, 27, 29 and 31 West Thirty-ninth street, which is back of the property held by the Engineers' Realty Company. It is understood that the total price for these properties is \$517,000.

The committee to whom Mr. Carnegie had made the offer called a meeting of the presidents of the different societies on April 30, the gathering including Alfred Noble, president of the American Society of Civil Engineers; James M. Dodge, president of the American Society of Mechanical Engineers; B. B. Lawrence, vice-president of the American Institute of Mining Engineers; Charles F. Scott, E. E. Olcott, John Fritz, John C. Kafer, George E. Weed, T. C. Martin, W. A. Redding and John Thomson.

The committee presented a statement, from which we quote the following:

"Location.—The site selected for the Union Engineering Building for the Engineers' Club and the National Societies on Thirty-ninth and Fortieth streets, between Fifth and Sixth avenues, is the ideal spot in America for such a building. However widely the membership and the interests of a society may be scattered, New York City must be recognized as the engineering center of the country. The location selected is in the very heart of the coming business center of New York. In the past, the means of travel from Brooklyn on the one hand, and from the west on the other hand, have centered by bridge and by ferry at the lower extremity of Manhattan Island; hence the congestion of business in that section. In common with the general northward movement the transportation facilities are changing. The new Pennsylvania Terminal, with tunnels to Brooklyn and to the West, the new station of the New York Central System, the facilities afforded by the Rapid Transit Subway, all point to the vicinity of Fortieth street as the coming transportation and business center of the metropolis. It is also the center of the hotel district.

"The four general engineering societies named by Mr. Carnegie are but a part of the engineering societies which are to be benefited by a Union Engineering Building. There are numerous societies, many of them strong and vigorous, whose membership contains many of the members of the general societies, but whose fields of activity are specialized in their scope. The work of these societies is of a high order, and taken in the aggregate it is a most important part of American engineering. Definite permanent headquarters and accommodations in the same building with those of other societies will be advantageous to the societies themselves, and will be of great convenience to their members.

"Functions of a Building.—Some of the uses and advantages of a Union Engineering Building may be indicated in a general way without entering upon details. A large assembly hall will be available for lectures and for the holding of general conventions of engineering societies. A number of smaller halls will accommodate smaller audiences, and will be suitable for monthly meetings of societies and for sectional or supplemental meetings at the time of conventions. The libraries of the several engineering societies placed in adjacent alcoves or rooms will constitute a magnificent engineering library. Economies will be effected as many books need not be duplicated, which would be necessary if the libraries were separate, and there may be reduced cost for administration. The several libraries may have a common index. Moreover, the Union Engineering Library will be adjacent to the new building of the New York Public Library, Fortieth and Forty-second streets. Rooms may be available for reading and writing. The building itself may become a gallery of portraits of eminent engineers and illustrations of engineering works. Accommodations for the administrative offices of the several engineering societies may be arranged to suit their various needs. Facilities for the officers, boards of direction, committees, as well as for the mailing, and possibly the printing, of transactions may be afforded. Facilities may be arranged for the serving of luncheons or dinners at the time of conventions or meetings, and for the holding of formal dinners and banquets. A common *cuisine* may serve the Engineers' Club and the engineering societies."

As we understand the situation, Mr. Carnegie will advance the funds for the purchase of the real estate, the interest on which is to be paid by the four engineering societies and by the Engineers' Club. Mr. Carnegie will give the entire buildings, to be equipped by the societies and by the club, the maintenance thereof being in the charge of the occupants.

A joint meeting of the Board of Directors of the several organizations is to be held on Thursday, May 7, at which the whole subject will be discussed.

The situation is in some respects a peculiar one. The four engineering societies each have a membership ranging between 2500 and 3000 scattered throughout the country and foreign lands. Whether or not all of the societies will join in acceptance of the gift is not quite certain for peculiar reasons. The American Society of Civil Engineers only a few years since erected a very handsome and commodious building on 220 West Fifty-seventh

street, the property being now valued at over \$200,000. The building itself cost over \$100,000. The American Society of Mechanical Engineers possesses a building at 12 West Thirty-first street, which is estimated to be worth about \$75,000. It is, however, inadequate for the purposes of the society. The American Institute of Mining Engineers has had its headquarters wherever its secretary happened to be located. For many years past this has been New York, and more recently commodious quarters in the Phelps Dodge Building have been secured. A movement has been organized lately in the institute to provide funds for an adequate library. The American Society of Electrical Engineers has for some time past sought an opportunity to establish a house in New York for its growing membership, so that this society is known to be in full sympathy with the plan of a Union Engineering Building.

The Use of Ferro-Phosphorus and Phospho-Manganese.

Low carbon basic open hearth steel, although for most purposes its superiority to the Bessemer product is conceded, has certain characteristics which have hitherto restricted its application in certain directions where it otherwise would have been more extensively made use of. Chief among these characteristics is its excessive softness, due to the fact that, excepting a few tenths of 1 per cent. of manganese and still less carbon, the metal is pure iron, the silicon and phosphorus having been, practically speaking, completely eliminated. In the manufacture of welded pipe this softness, which manifests itself in the fibrous and elastic nature of the material, caused when the material was first used for this purpose many failures and great waste in cutting the thread, which difficulties were overcome by the use of a special form of die. For sheet iron, black or tin plate this softness again causes trouble, here, however, owing to the easy welding properties of the steel, whereby the process of "opening the pack" becomes one of great difficulty, especially when the lighter gauges (No. 28 and upward) are being rolled. Now, if the steel contains a moderately high percentage of phosphorus, it can be rolled into black plate and similar forms at a lower temperature, at which welding cannot take place, so that the most obvious method of surmounting this obstacle is to rephosphorize, or, in other words, to restore in the ladle a portion of the phosphorus eliminated in the furnace.

Many suggestions have been made as to the form in which the element could be added, but practically all of them labored under the same disadvantage—namely, that the phosphorus, in the material proposed, existed in combination with oxygen and was accompanied by large proportions of other matter not only useless but harmful. The most generally used rephosphorizing agent heretofore has been apatite, a natural phosphate of lime, representative analyses of which are as follows:

Lime	42.09	40.80
Phosphoric acid (P_2O_5)	31.95	30.86
Silica	8.58	9.60
Alumina	5.62	4.86
Magnesia	2.63	1.84
Iron oxide	6.48	9.85
Volatile matters	1.84	2.10
Totals	100.00	100.00
Phosphorus	13.95	13.47

It is clear that such material as this is very unsuitable to add to a bath of steel for the purpose of raising the phosphorus contents of the steel. In the first place, the phosphoric acid must be separated from its bases and disassociated, and the extent to which this reaction takes place in a ladle full of freshly tapped steel is a factor of great uncertainty, as the metal already contains oxides in amounts which we cannot determine and the temperature varies within considerable limits which we are unable accurately to measure. The additional oxygen thus introduced can only be taken care of by ferromanganese or some other equally expensive material. Accompanying the phosphoric acid are impurities all of which have to be fused and kept in a molten condition at the expense of the heat of the steel in the ladle, and unless great care is exercised cold heats and ladle skulls are very apt to re-

sult. Furthermore, it is necessary to reduce the mineral to a fine powder in order to enable the steel to react upon the phosphate of lime, and in this condition a large and uncertain proportion is lost mechanically by the turbulent inrush of the heat into the ladle. In order to prevent reoxidation of the phosphorus the slag (some of which necessarily runs into the ladle) must be as siliceous as possible, and this, with ordinary practice, makes it very difficult to keep the sulphur within reasonable limits. Thus apatite as a rephosphorizer is objectionable for many reasons, the chief being the loss of heat in the ladle, where there is none to spare, and the uncertainty of the results obtained, which extends not only to the percentage of phosphorus in the finished product, but also to the carbon and manganese.

High phosphorus pig iron has also been suggested as a means of introducing phosphorus into the bath, but unless the iron were first melted in a cupola or otherwise a chilling of the bath would most certainly take place, owing to the large amount of pig iron necessary to introduce even a small percentage of phosphorus.

The foregoing difficulties were overcome at the Sharon Steel Company's plant a few months after it was put in operation two years ago by the use of ferro-phosphorus, a material which, although offering no special difficulties to manufacture, had previously to that time not been produced commercially, owing doubtless to the lack of demand for it. An English firm undertook its manufacture in quantity and shipped material of the following analyses:

	I.	II.
Phosphorus	17.23	25.56
Iron	79.40	70.66
Manganese	0.76	0.64
Silicon	1.46	1.80
Carbon	1.14	1.20
Totals	99.99	99.86

Sample I was taken from an early shipment and led to an attempt being made to raise the phosphorus contents, with the results shown in sample II.

The ferro-phosphorus was added in the ladle after the addition of ferromanganese, thus giving the latter an opportunity to take care of the oxygen. By doing this the phosphorus in the compound was all taken up by the steel and the amount of phosphorus in the finished material could be regulated to a nicety. A very few trials showed that the use of ferro-phosphorus was a great advance over apatite to attain the end in view, as the results could be foretold with certainty and the amount of heat absorbed was much less. Furthermore, the other elements of the compound, while of no particular value in improving the quality of the steel, at least did not affect the same injuriously and were recovered in the form of additional weight. On the other hand, it was necessary to introduce 3 pounds of iron into the bath for each pound of phosphorus, all of which had to be heated up to the temperature of the bath, thus demanding considerable heat from the steel in the ladle.

The last mentioned disadvantage has been overcome at Sharon by the use of a compound which may be described as "phospho-manganese." Shipments of this material, also obtained from England, where it was especially made for the Sharon Steel Company, showed the following average composition:

	Per cent.
Manganese	65
Phosphorus	25
Iron	7
Carbon	2
Silicon	1
Total	100

It will be seen that all the constituents of this alloy, except the small amount of iron, are of value in improving the quality of the steel and that the amount of metal which absorbs heat from the bath without any corresponding advantage has been reduced to a minimum. Furthermore, the actual cost of the phosphorus and manganese added in this form is much less than when added as separate compounds. It is possible by its use to tap the heat at a lower temperature, an advantage which will appeal to every practical open hearth manager.

Phospho-manganese is made in a blast furnace from

manganiferous ores, using apatite or other high phosphorus minerals as a flux. Patents have been granted to John Stevenson, Jr., formerly vice-president and general manager of the Sharon Steel Company, covering the use of ferro-phosphorus and phospho-manganese for rephosphorizing and also for the methods of manufacturing these compounds.

Concerning the practical results obtained by rephosphorizing, it may be said that after commencing the use of high phosphorus tin bar the percentage of steel wasters thrown out in the sorting room of the tin plate mill was cut down from 28 per cent. to 5 per cent. Nor was this the only advantage; as mentioned above, high phosphorus materials can be rolled at a lower temperature and in consequence there are not only fewer stickers, but the plate has a harder surface and a firmer gloss. This leads to an economy in the amount of tin used amounting to from 8 to 10 per cent. Furthermore, it is found that the operation of pickling takes place more rapidly and with a diminished expenditure of acid with high phosphorus than with low phosphorus material, whereby a further saving is effected.

The Labor Situation at Chicago.

The anxiety and apprehension which have held employers of nearly all kinds of labor during the week have given to business a hesitating and intermittent character. The ground upon which the employer has been standing is of a volcanic nature, with an eruption expected at almost any day. Fortunately, however, May 1, the critical moment, has passed with relatively little trouble. This has been due largely, however, to the reasonableness, if not the generosity, of employers, as well as to the conservative spirit exercised by the better element connected with trade unions.

The Molders.

The molders have been given higher wages and fewer hours, in accordance with their demands of the founders in this section. This action, doubtless, was governed to a large extent by the scarcity of molders. Whether this is due to the unusual activity in foundries alone or to the restriction of the number of apprentices by the unions is not of special importance at the moment, but probably both causes have contributed to favor the molders. Large interests in this section cannot obtain all the skilled help needed; hence that the molders should have been granted their demands at the moment is not surprising.

The Machinists.

The machinists have been pacified by the granting of a part of their demands, which were recently published in *The Iron Age*. The arrangement entered into between the employees and employers in this instance is of a temporary nature, but doubtless will be used as a basis for a permanent settlement. It is understood that machinists who heretofore have received 28 cents per hour have been granted 30 cents, and machinists who have been drawing more than 30 cents per hour have been granted an increase of 1½ cents per hour.

Blacksmiths have accepted a modification of the terms which they presented to employers. Committees are now considering the demands of the metal workers, buffers and other unions who have submitted their propositions to members of the Metal Trades Association. The prospect seems to be favorable for settlement of most difficulties without resort to further strikes.

Implement Makers.

The Deering Works of the International Harvester Company were closed down on Wednesday last as a necessary step to protect the interests of the company against the unreasonable demands of the employees. It is significant that no demands were made for higher wages or shorter hours prior to the disaffection among a small number of the employees, the demand being for recognition of the union. As the company had made no discrimination against organized or nonorganized labor, however, there seemed to be no justification for the action of the employees. It is to be noted, also, that it was only after the sympathetic strike of other workers prevailed that grievances against the management developed. The conditions of which the

twine girls complain will doubtless be thoroughly investigated by the company as well as by the Committee of Arbitration, should one be appointed. Although a relatively small number of employees were actually on strike, enough were absent from work to make profitable production impossible. The management state that it is the first time in 45 years that the works have not been in operation.

Inside Bridge Workers.

On May 1 the inside bridge and structural iron workers, who had previously given no trouble to employers, made a sudden demand for 20 per cent. increase in wages, to go into effect at once, and asking for an immediate reply. The temper of the men is such that just what trend affairs may take is problematical. Thus far the more conservative element of the union seems to control.

Those who are in position to know state that recently there has been a strong effort made to bring all of the inside bridge and structural iron workers into the union, but thus far only a relatively small number have been influenced into joining. Those who have entered the union have come principally from small shops. The unreasonable and even audacious demands of this union, as contained in the articles of agreement presented to employers in some places, are not generally known. The following proposed articles of agreement, however, make plain the demands of this union, and those who have made thorough canvass of the firms employing inside bridge and structural iron workers throughout the country state that there is undoubtedly unanimous opposition to the demands. This could be scarcely otherwise when it is seen that the articles of agreement provide that the members of the union are to abide by them without penalty, while employers are asked to conform to them under the penalty of the forfeiture of a cash deposit. And the demands not only provide that the union shall determine who shall work in the shops and fix the hours and rate of pay, but also that sympathetic strikes be allowed; for a representative of the union in the shops and recognition of the union as such. Employers interpret these demands to mean that the union will claim the privilege of not only saying who may work in the shops, but indicate in what manner the work shall be done, how much work shall be done and the men may strike whenever they see fit. All orders entered into, too, it is proposed, must be submitted to the approval of the union or its representatives. As experience has taught, there are labor troubles connected with this business almost constantly and which would at any time enable the union to call a sympathetic strike. The demands, it would seem, in no way obligate the union or its members to render any definite services in consideration of the obligations they demand of the employers, with whom they would leave few, if any, of the executive duties connected with the shops.

The employers have stated that they are not opposed to any organization which is formed solely for the prosperity and benefit of its members, in accordance with the laws of the community and sound business principles; but that they are strongly opposed to the demands made in this document. They also claim that the greater part of all the men working in their shops appreciate the folly of this radical movement and, consequently, have declined to become members of this organization on account of its objectionable principles and irresponsible leaders. Such methods, they feel, will be prolific of disastrous strikes, causing heavy losses to themselves without any resulting benefits.

ARTICLES OF AGREEMENT made and entered into this..... day of....., one thousand nine hundred and three (1903), by and between the "Inside Bridge and Structural Iron Workers, Local No. 54, International Association," of the city of Chicago, County of Cook, and State of Illinois, party of the first part, and..... of the city of Chicago, County of Cook, and State of Illinois, party of the second part, witnesseth that

The said party of the first part, in consideration of the covenants on the part of the said party of the second part, hereinafter contained, hereby covenants with the said party of the second part that the said party of the first part will abide by the articles of agreement hereinafter described, on or before the..... day of....., A.D. 1903.

And the said party of the second part, in consideration of the said covenants on the part of the said party of the first part, hereinafter contained, agrees to and with the said party of the first part that the said party of the second part will pay

to the said party of the first part or his order the sum of.....
.....dollars lawful money of the United States, immediately upon his failure to comply with the articles of agreement hereinafter described

NOW THEREFORE we, the undersigned, said party of the first part and said party of the second part aforesaid, do hereby mutually agree to a strict observance of the following described articles of agreement—to wit:

ARTICLE 1. That nine hours shall constitute and be regarded as one day's work; that 54 hours shall constitute and be regarded as one week's work; that there shall under no circumstances be any work done upon Labor Day; that all work done upon Sundays, legal holidays or after 10 o'clock of each evening on a regular working day, double time will be computed, and for every hour of overtime not herein provided for shall be computed and regarded as one and one-half hour's work.

ARTICLE 2. That the minimum scale of wages shall be as herein set forth; providing, however, said scale of wages shall in no manner affect any employee who is receiving more than the said minimum scale:

	Per hour. Cents.
For helpers.....	22.5
Machine hands.....	27.5
Fitters.....	32.5
Markers.....	27.5
Lay out.....	35
Template makers.....	35

ARTICLE 3. We favor recognition of the union.

ARTICLE 4. A sympathetic strike which is in violation of union principles shall in no case and under no circumstances be a violation of said contract.

ARTICLE 5. That the business agent shall have the privilege at all times of calling at the shop for the purpose of settling any disputes or controversies between employer and employee.

ARTICLE 6. That five (5) members of this union shall constitute an Examining Board, whose duties shall be to pass upon the competency of men employed or about to be employed.

ARTICLE 7. Now therefore we, the undersigned, said party of the first part, and
said party of the second part aforesaid, do hereby mutually covenant and agree that
..... and
of said city of Chicago, County of Cook and State of Illinois, or any two of them, shall arbitrate, award and determine of and concerning all manner of actions and causes of actions, and demands whatsoever, now pending, existing or held by and between us, the said parties; and we do further mutually covenant and agree, to and with each other, that we will in all things faithfully observe and abide by the decision and award of said arbitrators shall make in writing, on or before the.....
day of, A.D., 1903.

IN WITNESS WHEREOF the parties to these presents have hereunto set their hands and seals the day and year first above written.

..... [Seal.] [Seal.]
..... [Seal.] [Seal.]
Signed, sealed and delivered in the presence of
.....

PERSONAL.

L. Sevaillier, the official representative of the British Royal Commission to the St. Louis Exposition, has arrived.

Ysbrand B. Haagsma has resigned the offices of secretary and general auditor of the Republic Iron & Steel Company and the resignation has been accepted by the Board of Directors. Mr. Haagsma is to become president of the United States Trust & Savings Bank, which is being organized under the State laws of Illinois. The capital of the new institution will be \$1,000,000. It is reported that the new company will succeed to the business of Level & Co., private bankers, and will occupy the former banking rooms of the Merchants' Loan & Trust Company at Washington and Dearborn streets, Chicago. H. L. Rownd, assistant treasurer of the Republic Iron & Steel Company, has been elected general auditor to succeed Mr. Haagsma. As yet no action has been taken as to the secretaryship.

E. P. Roberts & Co., consulting engineers, of Cleveland, announce that they have opened a branch at 25 Broad street, New York, which has been placed under the management of William C. Andrews.

William Kent, the well-known engineer and one of the associate editors of the *Engineering News*, has been offered the position of dean of the L. C. Smith College of Applied Science at Syracuse University.

John J. Cone and James C. Hallsted of Robert W. Hunt & Co. sailed for Europe in the "Campania" on the 2d inst., the former returning abroad after a few weeks' visit home. Mr. Hallsted has gone over to give his per-

sonal supervision to the inspection of the structural material for two large London hotels which has been awarded to his firm. These contracts, together with several others for buildings to be erected in England and South Africa, as well as the bridge material for this continent, has compelled the firm to organize a foreign structural and bridge department in addition to the one in charge of rails, splice bars, billets, &c.

J. E. Thropp, Jr., has resigned his position of general manager of the Everett Furnace at Earlston, Pa., and its subsidiary operations.

Charles M. Schwab was unanimously re-elected president of the United States Steel Corporation at a meeting of the directors held on Tuesday, May 5. This was the first meeting of the directors since the annual stockholders' meeting. All the other officers were re-elected, Senator John F. Dryden of New Jersey being chosen a director to succeed the late Abram S. Hewitt. The committees of the corporation remain unchanged.

Karl Schneider, chief engineer of the Rombach Steel Works at Rombach, Lorraine, is now in this country.

R. P. Kelly, secretary and treasurer of the Braeburn Steel Company, Chicago, retired on May 1, having sold his interest to Chas. M. Metcalf. Mr. Metcalf will succeed Mr. Kelly as secretary and treasurer.

James Cochran, vice-president of the Lalance & Grosjean Mfg. Company, New York, has gone to the Pacific Coast for rest and recreation. Mr. Cochran will make a two months' tour of the United States.

David Hunt, Jr., has been elected treasurer of the Baush Machine Tool Company, Springfield, Mass., to succeed S. L. Platt, resigned. Mr. Platt will engage in business in New York.

John C. Searight, formerly assistant superintendent, has been appointed superintendent of the furnaces of the National Steel Company at New Castle, Pa. George Brenner succeeds him as assistant superintendent.

Bennett H. Brough, secretary of the Iron and Steel Institute, has been appointed a member of the British Commission to the Louisiana Purchase Exhibition at St. Louis.

Among the passengers on the "Oceanic," which arrived in New York Wednesday, April 29, were Geo. W. Darr, formerly president of the Sharon Steel Company; W. J. Alford, vice-president Ames Shovel & Tool Company; Clyde M. Carr, secretary of J. T. Ryerson & Sons, Chicago, and Geo. T. Oliver of Pittsburgh.

James Ross of Montreal, president of the Dominion Iron & Steel Company, has returned from Europe.

John W. Gates sailed on the "Oceanic" to-day for a vacation of several months.

J. B. Nau, the well-known metallurgist, who has been actively connected with the management of a number of American steel plants, has established himself as consulting metallurgical and mechanical engineer with headquarters at 1 Broadway, New York.

At a meeting of the Board of Directors of the Illinois Steel Company, held on May 1, C. H. McCullough, Jr., was elected second vice-president, charged with the supervision of general construction, with headquarters at the general offices in the Rookery Building, Chicago. On the same date, May 1, George L. Reis was appointed general superintendent of the South works of the Illinois Steel Company by President E. J. Buffington, with offices at South Chicago, vice C. H. McCullough, Jr., transferred. The president also appointed R. B. Charlton general superintendent of the Milwaukee works, with offices at Milwaukee, Wis., vice George L. Reis, transferred.

The first iron steam vessel run in this country plied between Boston and Bangor, Maine, and was named for the latter port. She was built by Harlan & Hollingsworth, at Wilmington, Del., and was 120 feet long by 23 feet beam and 9 feet depth of hold. The "Bangor" had both steam and sail power, having independent engines of 22-inch cylinders by 24-inch stroke driving twin screws. In 1846 she was sold to the Government for \$30,000, and under the name of the "Scourge," took part in the Mexican War.

The Iron Age

New York, Thursday, May 7, 1903.

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JOHN S. KING,	- - - - -	BUSINESS MANAGER.

The Apprenticeship Question.

Attention is freshly drawn to the status of the apprenticeship question in this country by some of the observations made by the members of the Mosely Industrial Commission. Liberal extracts from their reports were published in our issue of last week, but it was not practicable to include much relative to apprentices. Quite a number of them were of the opinion that specialization in so many of our workshops meant the destruction of the skilled mechanic, thus making it necessary to draw on the workmen of foreign countries to supply this essential factor in industrial progress. Observing opportunities for future employment of men of this class, Alex. Wilkie of the Associated Shipwright's Society remarks to his British constituents: "It is somewhat regrettable that, through the rush for so-called cheap labor, the apprenticeship system here has been somewhat discontinued; for we found on our tour that, wherever there was a British workman of fair and average capacity, he was generally in some position of more or less trust and responsibility. This shows the importance of the continuance of the apprenticeship system in this country, aided by a sound elementary and up to date secondary and technical education. So far as the United States are concerned, the fact was given to us on high authority that in consequence of the extreme subdivision, specialization and classification of labor, the learning of a trade was almost a thing of the past; as a result, it was found necessary to obtain skilled workmen from abroad."

Although Mr. Wilkie assigns as the reason for the decadence of the apprenticeship system in England "the rush for so-called cheap labor," it is more likely that a stronger reason is the limitation of apprentices by the trades unions which is now being enforced to so great an extent there as well as here. That more apprentices would be employed in England if employers' hands were not so completely tied is admitted by J. Maddison of the Friendly Society of Iron Founders of Great Britain and Ireland, who in his report on the subject of molders in this country says that "specialization is carried out to such an extent that they are not making all around molders and consequently are depending on other countries to supply their requirements in that direction. The English employer often whines over the restriction of apprentices to one for four journeymen, but in the States they only allow one to eight journeymen. The British employer has more to learn from America than the British workman." It would seem, therefore, from his statement, that union restrictions in this country with regard to apprentices are vastly more onerous than in Great Britain, although it had been supposed that the domination of trades unions was much more complete there than here.

While specialization obtains to a great extent in those workshops of the United States in which duplication of products is conducted on a large scale, yet this specialization necessarily cannot include more than a fraction of those engaged in mechanical pursuits. A greater number of workmen are employed in industries requiring careful training on the part of the mechanic than in

shops in which specialization can be carried out. Nevertheless, in all industries in which workmen are organized it has been one of the cardinal principles of the organization to limit the number of apprentices, so as to prevent much of an increase in the operatives in their trade. To such an extent has this gone that in some instances unions have attempted to bar the employment of any apprentices whatever.

An interesting case bearing upon the restriction of apprentices is the attitude of the Iron Molders' Union of North America. At the convention of that organization, held at Toronto, Canada, on July 7 of last year, President Martin Fox, in his presidential address took a commendable stand on the apprenticeship question. Referring to the conference agreements with the Stove Founders' National Defense Association, he said that the ratio of apprentices had become a very prominent subject of discussion. As a result of the agreements with that body, strikes have largely disappeared and the supply of molders he hoped would soon be dependent upon the union ratio. He said that should the convention determine to increase the present ratio of apprentices, or empower its representatives to negotiate with foundrymen's associations a ratio mutually agreeable, there would be considerable discontent and complaint at the outset. But so confident was he "that such a policy would result in turning out mechanics of greater competency, operate to the material advantage of the union and establish much desired uniformity," that he strongly recommended the convention "to liberalize the present ratio of apprentices and conform it intelligently to the needs of a growing industry." Last year, as at the present time, the supply of stove plate molders was not equal to the demand, and in many foundries great inconvenience was experienced because of this fact. It seemed to be an absolute necessity that steps should be taken to provide for an increase in the number of molders, and therefore the stove foundrymen, assisted as they were by the recommendations of President Fox, had strong hopes of securing a more liberal allowance of apprentices that one to eight molders. Nevertheless, the members of the convention refused to consider this aspect of the situation and decided not to increase the ratio. Consequently the supply of molders in stove foundries must be recruited from the ranks of other classes of molders.

In the reports of the members of the commission, the conditions prevailing in the Baldwin Locomotive Works, at Philadelphia, are severely criticised. This happens to be one of the great industrial institutions in this country in which labor is free. The regulations of trades unions do not control the workshop of this establishment. Therefore the British visitors, all of them secretaries of trades unions, were unsparing in their denunciation of its methods. Yet in these works a system of apprenticeship has always prevailed, which has resulted in turning out a steady stream of skilled mechanics. Wherever an establishment of this kind is found the opportunities are open for the youth of this country to learn a trade and become fitted to earn a living as skilled mechanics. But an establishment of this character is condemned and not commended.

The choking of the avenue to a trade is one of the most serious faults of the present management of trades unions of America. It is a grievous matter, as it prevents many boys from acquiring the practical training which would enable them to earn a good living and assist in the material advancement of the country. It is asserted by those who feel strongly on this subject that many boys who would otherwise become useful citizens are only able to find precarious employment and ultimately become idlers and even criminals. No true lover of

his country can with patience contemplate the future with regard to its supply of skilled workmen. It should not be necessary for us to depend even in the slightest degree upon the workmen of Europe to recruit the ranks of our mechanics. We should have growing up in our midst a class of American skilled workmen, upon whom this country would be able to rely. The alertness and intelligence of the American mechanic have been the foundation of the supremacy which America has attained among the manufacturing nations of the world. To retain this supremacy it seems to be absolutely necessary that the trades unions should be forced to adopt more liberal rules relative to apprentices and enable a greater number of American boys to acquire the knowledge of a handicraft.

Submarine War Engines.

Few subjects have greater fascination for the average civilian than that of submarine engines of war. The results of progress in this direction have been at once so promising and so apparently futile that one who is not in possession of the secrets of the Navy Department scarcely knows whether the fleets of the nations are at the mercy of that which moves beneath the surface of the water, or whether such menace exists only in the imagination of the inventors of craft which, after wonderful performances, of which such accounts as reach the public are literally hair raising, are rejected by the governments to which they are offered and ultimately find their way to the junk heap and are forgotten. The latest fiction of a lively nautical fancy comes from England, in the story of a submarine monster possessing most of the remarkable qualities of the "Nautilus" of Jules Verne's romance. It is claimed that when submerged it may enter any harbor unseen and unsuspected, do whatever damage its manipulator pleases and escape without coming once to the surface. It may wander about with the facility of a mud turtle, select its objects of attack with inerrant accuracy, project destruction with ram or torpedo, and thread its own way among mines with entire safety. The probabilities are that theoretically it is capable of doing all of these things, that experimentally it might do some of them, and that practically it could do none of them. The history of the submarine boat has been one of

"Large desires with most uncertain issues,"

and that this will continue to be true for some time to come is a safe assumption.

In the planning of submarine war engines the essential fact seems to have been generally overlooked that action and reaction are equal, and that while a boat of this character may be designed which will, under favorable conditions, blow up a cruiser or a battle ship, the force needed for this purpose would be likely to annihilate it, since it must be within the sphere of destructive influence created by its own appliances. It will perhaps be remembered that during the Civil War there was built at Charleston a little boat named the "David," the function of which was to raise the blockade of that port. When she was ready she sailed out of the harbor carrying at her bow an adjustable spar, at the end of which was a torpedo containing a charge of 60 pounds of gun powder. With this, while herself submerged to the depth of 10 feet, she struck the "Hoosatonic" of the blockading squadron, and sank her, but not until some years afterward was it known what had become of the "David." Then divers sent down to see what remained of the "Hoosatonic" found the wreck of the submarine destroyer, and also the bodies of her crew of nine men.

She had been destroyed simultaneously with her victim, and yet the charge which did this double execution was trifling compared with those talked about in connection with the later types of submarine engines—1000 pounds of nitro glycerine or dynamite, for example.

Conceding that steady progress will be made toward practical standards in the designing and construction of submarine war engines, it should be remembered that equally rapid and even more substantial progress has been made and is constantly making in the defense of harbors against attack from craft of this character. Captain Charles A. McEvoy of the British Navy, in a recent discussion of harbor defenses, is authority for the statement that means are now at command for detecting the presence and locating the position of a submarine boat so accurately that such a thing as the surreptitious and unsuspected entry of such a craft into a harbor defended according to modern naval knowledge would be impossible. On this subject he says: "How it is done the writer is not at liberty to disclose, but it is done, and the crew of the submarine that should attempt to run the gauntlet of our mine fields in blind ignorance of what is before them in the dense medium they are moving in, will find they are expected and meet with an appropriate reception." No doubt this is partially true, at least. It is certainly true that the branch of naval science which deals with mines and defensive torpedoes has experienced a high development, materially aided by the variety and accuracy of the electrical appliances available. The mines now employed for harbor defense are generally electrical, and sometimes combine the electrical and mechanical features. What are known as "contact and observation mines" are moored to float below the surface at such depths as to insure contact with them by the hulls of passing vessels. Under ordinary conditions such accidental contact would do no harm, but when the mines are rendered "active" by the proper amount of electrical excitation, it would instantly explode them. If, however, it appears to the observer on shore that a vessel which it is desired to cripple or destroy is likely by good luck or good management to escape touching the mines in its path, the pressure of a button will explode them one at a time, selectively or in groups, as may be desired. The relatively shallow waters outside the channel are usually defended by contact mines anchored about in such a way that only by the merest chance could any kind of craft work its way safely between or among them. These are always active, and the prudent commander of a submarine boat would naturally give them a wide berth. To keep the channel mines active would be to place an effectual embargo upon all shipping, more "effective" than a hostile blockade, which might be run under favorable conditions of weather. They may, however, be made active by an expedient as simple as that of turning an electrical switch, and if Captain McEvoy is right in saying that no submarine boat could now enter a properly defended harbor without giving sure indication of her presence and position, the harbor mine still has much the best of the argument.

It should also be remembered that the limitations of engineering skill in the matter of attaining an arbitrary, and at pleasure variable, specific gravity, are well defined. Complete submergence involves serious and almost insurmountable difficulties, unless the object in view is to seek the bottom and stay there. More serious than all, however, is the fact that the effect of a submarine explosion upon a craft completely submerged is vastly more serious than upon one floating upon the surface. Assuming that such a boat could rush the

mine field and enter a harbor undetected, there is every reason to believe that its first offensive operation would cripple or destroy it. As it looks now, the practical flying machine and the practical submarine boat for offensive naval operations will go hand in hand for another century or two, fulfilling expectations in some respects and disappointing them in others, and hovering just near enough to success to tempt the imaginative inventor and the adventurous capitalist, by promising the impossible.

Silver and the Philippine Coinage.

When Congress enacted the law providing a monetary system for the Philippine Islands a force which should turn the tide of fortune for the white metal was born. This fact was quickly brought to the attention of the United States Government and already had been discerned by the prevision of the ubiquitous speculator. Bar silver began to rise in November, 1902, but the appreciation of the metal was slow until after the plan for the insular coins was given life by legislative action. Within the last two weeks silver bullion has advanced 2 cents per ounce, and the national Government has paid as high as 54½ cents within a few days. From the low point of 1902 the market value of silver has risen 7 cents per ounce. While there is nothing in the present movement to indicate a return to the level of value attained under the influence of the act of 1890, there are forces at work more favorable to the steady maintenance of the value of silver in relation to gold.

This element of stability is of more importance to the world of finance and trade than is the higher price now prevailing for bar silver. The erratic fluctuations to which the white metal was subjected for years killed many budding industrial enterprises connected with the Far East and have retarded seriously the development of Oriental trade. Capital, being proverbially timid, leaves the hazardous fields of profit to the bold speculator, who seeks plunder, not investment.

In this connection it should be recalled that China and Mexico have invited the United States to join them in formulating plans to secure some degree of stability of exchange between the gold standard and the silver using countries and that a commission has been appointed to confer with European governments upon this subject.

The United States is more directly interested in securing a definite and, as near as possible, a permanent relationship between gold and silver now that the welfare of its insular possessions must be protected. A poor community, like that in the Philippine Islands, is always in danger of being deprived of its gold circulating medium through the operation of natural laws, the gold going to enrich a stronger financial community in the course of trade and money currents. Hence a so-called "managed" currency, such as is being provided for the Philippine Islands, is not only justifiable but necessary to enable the Administration to counteract the power of a rich community to deplete the islands of their precious coin—the life blood of trade.

The adoption of a distinctive silver coin to be maintained at a fixed gold parity gives to the Philippine community a local money which has a greater value within the circle of gold redemption in the islands than abroad, and therefore brings the coin home after it has been astray. By arranging for a gold reserve and for the issue of silver coins which are legal tender only in the Philippine territory, in conjunction with the power to maintain the value of these coins—even if it becomes necessary to exercise the prerogative of taxation—pro-

vision is made against the law of marginal utility which, unchecked, would deplete the islands of gold.

By law the gold peso—the unit of value in the Philippine Islands—is to consist of 12 9-10 grains of gold, nine-tenths fine, while the silver peso—not to exceed 75,000,000—is to weigh 416 grains, nine-tenths fine. These coins are in addition to the coins authorized by the act of July 1, 1902. To maintain the parity of the gold and silver coins the Insular Government is authorized to issue temporary certificates of indebtedness—not to exceed \$10,000,000 or 20,000,000 pesos—nontaxable and redeemable in gold coin of the United States.

Fortunately, perhaps, for the Insular Government the United States Treasury Department has been in position to assist, or at least to protect, the interests of the Philippine Islands against a too rapid rise in the price of silver.

The new coinage law requires the Philippine Government to have on hand at least 5,000,000 pesos before the gold standard becomes effective, and also, for the economical working of the mints, bullion somewhat in excess of the first month's coinage had to be immediately available. And were it not for the further fact that the United States Government had bullion to spare temporarily, it would have been necessary for the Insular Government to have purchased several million ounces of silver at once. As it is, it is estimated that purchases in excess of 250,000 ounces weekly have not been and will not be necessary. The Philippine Government has been in a position, however, to take advantage of the market in having had money available from the sale of certificates of indebtedness for the purchase of bullion.

As the mints at San Francisco and Philadelphia coining the pesos have a capacity for about 2,000,000 pesos per month it is expected that the new system can be inaugurated about July 1, and after this has been accomplished there will be less pressure for bullion supplies, with the Government better able to take advantage of the fluctuations in the market.

To the extent of the amount of Mexican and other silver coin in the Insular Treasury the Philippine Government has been benefited by the rise in the price of bar silver, and by the sale of this coin in Hongkong has been able to neutralize, to some extent at least, the higher prices paid for bullion in the United States.

The United States Government, too, may lend further assistance by accepting the next installment of the Chinese indemnity in silver, instead of having it sold abroad and this coin utilized for the benefit of the Insular Government.

The experience of the last ten years has shown that the production of silver is not directly increased by an advance in the market price of bullion. This is due to the fact that there are few, if any, silver mines in the United States that can be profitably worked at the prevailing price of silver and that a large part of the production of silver ore comes as a by product of copper and lead mining.

It is claimed that the decline in silver for a long time prior to last November was hastened as much by the method of sale of bullion in the London market as by the decreased demand, and may still operate against a rapid rise.

There has recently been a strong tendency to discount a further rise in the price of silver in the City of Mexico, where exchange has been sold to some extent at a higher price than bullion in the market at London. How much these exchange operations may influence the market is a question which the future only can decide. But from the present outlook it seems likely that the market will be

sustained at least until the middle of June, by which time full provision will have been made for the first 5,000,000 peso installment for the Philippine coinage.

CORRESPONDENCE.

A Warning.

To the Editor: Within the last four months an individual well acquainted with the conditions of chemical laboratories of manufacturing plants, especially iron and steel works, is plundering the chemical laboratories in Virginia, West Virginia, and now Ohio, of their platinum ware. We have had over a dozen of such robberies reported within the last four months, and from the way the thief goes about it it clearly shows that he must have been a former iron chemist, thoroughly acquainted with the conditions of the chemical laboratories in the districts mentioned. From what we learn he is now traveling up the Ohio River, getting into Pennsylvania, and a great service can be done by your valuable medium if you make these facts known, to put the chemists of iron, cement and steel, &c., works throughout the Central United States on their guard against him. If you will take notice of it you will oblige the undersigned, as well as be of benefit to the concerns mentioned.

Yours truly,

EIMER & AMEND,

AUG. EIMER, Vice-President.

NEW YORK, May 4, 1903.

American Conditions and Competition.

Appendix to Report on the Manufacture of Pig Iron in America.*

BY AXEL SAHLIN, MILLOM, CUMBERLAND.

Having been requested by your secretary to add a few words to the report which was submitted to you in January, 1902, I take this opportunity to express to the members of this association my grateful appreciation of the honor which I consider that they have conferred on me in selecting a foreigner, domiciled in their country only during a few years, to aid in reporting on the great development which has taken place in my adopted country across the ocean during the past decade, and on the influence which this development may have on the great British industry in which we all are so vitally interested.

This addition to my report may be all the more proper, as I have but recently returned from America after spending the better part of January and February of the current year on a new tour of inspection in that country. I should, therefore, be in a position to say a few words about the changes which unquestionably have taken place in the iron and steel industry during the past year.

Iron Ore.

The visible ore supply, as far as was publicly known, has not been very largely increased. Some new discoveries have been made in the Lake Superior region, but they are not of revolutionizing importance. Iron ore finds have also been developed in Western Ontario to the north of Lake Superior, but these do not promise in any way to alter conditions in the iron trade. More important from our point of view are the continued discoveries in Nova Scotia and Newfoundland. In this region new developments may be confidently looked forward to. In Cuba some valuable lodes of magnetite, well within the Bessemer limit, are being investigated, which, sooner or later, may lead to the construction of important works on the Atlantic Coast.

In ore transportation some notable improvements have taken place.

A new type of ore steamer, having the hold divided into a number of hopper-shaped rooms, one under each hatch, makes it possible to unload almost an entire

cargo without manual labor. This result is facilitated by the design, also during the past year, of a successful automatic scraper bucket, which may best be described as a clam shell bucket, in which both halves approach each other, moving in a horizontal direction, with the edges of the clam shells standing at an angle of about 30 degrees to the horizontal. This bucket will dig any kind of ore, coal or broken stone. It is usually built to lift 10 tons per trip, and is reducing the cost of unloading iron ore from ships, or of lifting material from the ground, to a minimum. It may be attached to an ordinary 10-ton yard crane with excellent results.

Another important feature is the rapid increase in number of 50-ton steel cars, with a tare weight of from 23 to 28 per cent.

Blast Furnaces.

The building of blast furnaces in America has, during the past three years, been so rapid that the coke supply has not kept up with the requirements. During my recent visit I saw, within two days, seven of the most effective blast furnaces belonging to the Steel Corporation, estimated to have an average capacity of 600 tons per furnace per day, banked for want of coke. During these times of enormous profits, and seemingly endless demands, one entire modern steel plant, with three large furnaces, was shut down for the same reason. When such was the position among the properties of the Steel Corporation, who control the most of the Connellsville coke ovens, it is easy to understand the effect of the coal famine on furnace plants which must purchase their fuel in the open market. The most successful blast furnace company in the Eastern territory have been able to run their furnaces only intermittently, and showed as the result of last year's work, under the most favorable market conditions, a profit of only £12,500, and the gloomy view taken of the future is reflected in the presidential yearly report. In this way the coal strike and coke famine has been making itself felt in the iron industry.

In blast furnace construction there is a reaction from the excessively large furnace. It has been found that the expense incurred whenever one of these large furnaces, built a few years ago, gets out of order is very great, and that the effect of a large percentage of incidentally high sulphur iron on the average metal from the mixer is apt to cause variations in the steel works. The latest conclusion is that it is better, though somewhat more expensive, to run two 300-ton blast furnaces than one of 600 tons capacity. The capacity of from 300 to 400 tons is at present the one most generally recommended for new furnaces.

The furnace top on many of the most modern furnaces is, as a guard against explosions, built of extra strength and hermetically closed; and the charging apparatus, in the refinement of which some builders had, unquestionably, gone too far, is being built simpler and more substantial.

Some furnace builders are giving up the elaborate and complicated system of hundreds of bronze cooling plates built into the bosh walls for the simpler and equally effective plate casing, with proper distributing arrangements for water cooling.

As regards blowing power: America adheres, up to date, to the steam engine. Europe is ahead both in the employment of gas engines and steam turbines. The reason probably is that the Americans of late have had such good times, and have been so busy making money, that the inducement has been lacking just at present to proceed with innovations which, however successful, are bound to involve considerable experimenting and delay before a proper solution of all details has been found. At the new Lackawanna Works, near Buffalo, there will, however, be employed 42,000 horse-power of Körting gas engines, built by the De La Vergne Refrigerating Company of New York.

Steel Manufacture.

The basic open hearth process continues to grow rapidly, encroaching on the Bessemer converter and the acid Siemens furnace. The prevailing size of the open hearth furnace is maintained at 50 tons. Many large plants with from 6 to 15 of these 50-ton stationary fur-

* Paper read before the conference of the British Iron Trade Association, March 31, 1903.

naces have recently been built, or are being built, in all districts. One large company have adopted the Bertrand-Thiel process of desilicizing, decarbonizing, and roughly dephosphorizing the iron in one furnace, afterward transferring the metal into a special refining furnace where the remaining phosphorus is extracted with the aid of an addition of fresh lime. Another important firm have introduced a 200-ton Talbot continuous furnace.

A unique development is the starting all over the country of a great number of small steel foundries, working with bought metal and scrap, and producing steel castings of superior quality at comparatively reasonable prices. Steel castings are gradually taking the place of iron castings, wherever subject to variable stress or vibration. In this industry there is an outlet for small capitalists which the large aggregations cannot easily close.

Rolling Mills.

The rail mills were reported to be running full on orders, extending over the whole of the remainder of the present year, and contracts were being made for delivery in 1904. Speaking of rails, it is well worth pointing out that the jagged line, which until two years ago graphically has recorded the rise and fall in the price of rails, since the establishment of the Steel Corporation has been changed into one straight, horizontal line at the \$28 per ton level. This line speaks volumes, and we can but wonder how long even the mighty Steel Corporation will be able to extend the same. As long as this line does not waver, the iron and steel industry of the world at large is secure. Continuous rolling is rapidly gaining ground for producing billets, rods and merchant steel. The new three-high plate mills, of which I saw several under construction, are of largely increased strength, capacity and size. Universal mills are being added to most plate producing establishments.

The puddle process, which for years has been unimportant, is gradually losing ground. Even during these busy times some of the remaining puddle works in Eastern Pennsylvania were not able to run more than half time, and we all know that this way of working is not profitable.

The Young Man.

Never before have I seen so many young men in control of large affairs and so few older ones in evidence as recently in Pittsburgh. Not only are young men employed as executives and managers, but to deal with these other young men must be found. Older men are not as a rule sufficiently adaptable, rapid and energetic to enter into the spirit of the new times. For that reason most agents and business men dealing with the iron industry are also young. Thorough education, both theoretical and practical, is more and more becoming a *sine qua non* for success.

On inquiring for the older men, I found many whom I used to know living retired on what money they had accumulated. Others had their own business and employed younger men to do the executive work. It seems at first thought a waste to retire so many yet capable men with a large fund of practical experience, but we must ask ourselves: Is not the old country habit (which it is proper to say is far more pronounced on the Continent than in Great Britain) of keeping young men fully developed, overflowing with health, with energy, with faith in the future and in their own strength, in subordinate positions, advancing them slowly as they age, and permitting them to arrive at important positions first when they are well up in the forties, with energy broken by waiting, disappointments, or, perhaps, by domestic cares, even more wasteful? In the former case there are probably two young men to one older. The older man, after reasonable success, has laid by something to live on, or if not, may, on an average, expect assistance from a more numerous younger generation; whereas in the old countries the young man, largely preponderating in numbers, often for years is supported or assisted by a smaller number of older men. Is not, therefore, the old country system more extravagant than that recently developed in the new world? Howsoever this may be, the fact remains that the men in power and in positions of trust in the American business community to-day are the men between 25 and 45 years of age.

Labor.

As far as the direct manufacture of iron and steel is concerned the labor situation is easy. Good pay, fair treatment and numerous labor saving devices, partly dispensing with men, partly making work easier, have regulated the relations between masters and men, so that no serious disturbances are likely to occur in the near future. Among the crude labor—miners, coke makers and others—and in many of the affiliated industries of manufacture and transportation, the American labor situation gives rise to serious concern, especially where large numbers of ignorant and untrained foreigners are employed. The American workman is often a capitalist in a small way, and has something to lose. He is always aspiring to improve his social position, or at least that of his children. Therefore, he is easier to deal with than those who simply let themselves be led by men making such leadership their business. The Steel Corporation have greatly reduced the percentage of union men in their employ, and are, according to good authority, convinced that the average skilled nonunion man works better and earns more money for himself than does the union man. They are evidently shaping their policy accordingly.

The General Situation.

During my stay in America the Steel Corporation completed the purchase of two great industries—the Union Steel Company of Donora, Pa., and the Sharon Steel Company of Sharon, Pa.—both controlling important coal fields and mines; and at the time of my leaving Pittsburgh rumors were rife that negotiations were in progress for the absorption of the largest and most successful of the remaining independent plants, at a figure said to be not far from \$80,000,000. If this purchase had been completed, which evidently has not yet been the case, the only competition that could be seriously waged against the Steel Corporation in staple products would come from the works controlled by the Pennsylvania Railroad—viz.: The Cambria, Pennsylvania and Maryland Steel companies, and later from the new Lackawanna Works, at Buffalo, which yet are far from completed.

This preponderance of the Steel Corporation I consider very fortunate for the British and European iron trade. The Steel Corporation, with their heavy capitalization, will, unquestionably, use every resource to maintain prices at somewhere near their present level, at which most British works can undersell the American product, both at home and, what is more important, in colonial markets. America is at present developing at an enormous rate. All pursuits, especially that of farming, are profitable. The large American exports, without any corresponding import, are paid for year by year, partly by the return of American securities previously held abroad, partly in cash. Money has, therefore, become comparatively plentiful. The rate of interest has fallen gradually, though not to the same point as in Europe, and new enterprises in the vast and fertile territory of the United States are everywhere in evidence. The old law of the wavelike advance and retardation of human progress can, however, not be set aside by the American people any more than by the nations who, before their time, have led the way. Such an activity and such facilities for obtaining money, and engaging in new enterprises, as have been found in America during the past year cannot permanently continue. Even the great steadying influence of the trusts will not suffice very long to hold off the day of readjustment and contraction. When this day comes there will be a shrinkage in values and a tightness of money, which will bring down all prices to a point but little above cost. Most people in America are sanguine that the present state of affairs will continue at least during the remainder of the current year, but they are looking forward with some uneasiness to the coming Presidential election of 1904.

When the contraction comes we will, undoubtedly, feel both American and German competition keenly in the British and colonial markets, as our territory is the only one open for exploitation without protection. There are in the United Kingdom a considerable number of iron enterprises which were based on conditions no longer existing. There are others which never had an excuse for

their coming into being. These concerns will, undoubtedly, be brought to a stop, and much money will be lost in them; but, on the other hand, I have always maintained, and the more I learn about the relative conditions and possibilities in Great Britain and America the more I am convinced that the better part of our iron and steel industry occupies an unassailable position. Naturally, this position cannot be maintained or be made profitable unless we take advantage of the improvements for which British engineers and chemists in the past largely have laid the foundations, but which we of late have permitted foreign countries to develop.

The great resources of Canada are beginning to be utilized. Those of Australia and India are being investigated. Those of South Africa are being discussed. In all, a new British territory, with three times the area and population of the United States, and with enormous resources, lies ready to be developed. Far from feeling concerned about the future of the industry in the British Empire, I, therefore, see for that Empire possibilities of a development which one day will astonish the world, and I also predict for it within the span of two generations a market and a field of employment for its products which will justify its development. Until this development gradually arrives, however, we must in our unprotected state expect a most serious competition and invasion in our entire iron and steel market, and this will come as soon as the market abroad is unduly depressed.

Suggestions.

There are some steps which we in the meantime might take which would greatly aid us—viz.:

1. The securing by purchase or consolidation, or otherwise, of the control of as large a share as possible of our own raw materials from the mineral in the ground to the finished product. In bad times this will enable us to work with one profit only; in good times all the profits will be ours. Mr. Carnegie was the first man energetically to carry out this idea, and it gave him the unquestioned control of the market and advantage over all competitors. It will be difficult to succeed if we, at every step of manufacture, must contend in hot competition with our neighbors, as well as with the foreigners, whose proficiency and material advantages we have to meet.

2. In coal mining we must take more general advantage of all automatic coal cutting, transporting and conveying machinery, of washing and separating methods, and of larger and proportionately lighter railway wagons. By-product coke ovens located at the iron and steel works must, together with the blast furnace, furnish mechanical energy at the same time as they increase the yield of coke from each ton of coal.

3. The methods of ore transportation must be improved. The design of the ore steamers should be altered to fit them for cheap and automatic loading and unloading. We must arrange for larger trucks, automatic shipping piers, and up to date automatic ore handling machinery. In this latter item we have immediately available a method of effecting a substantial saving.

4. Works which we find unprofitable to operate, on account of high freight charges, and which are helplessly in the clutches of uncompromising and shortsighted railway companies, can, as an extreme measure, be removed to more suitable locations. We have many precedents for such steps among our American competitors. It may be the only salvation from being slowly bled to death.

5. The employment of the caloric capacity of coke ovens, as pointed out above, and especially of blast furnaces, must be utilized to the utmost to provide power for subsequent manufacturing processes. Therefore, blast furnace works, steel works and manufacturing departments must combine.

6. The use of automatic machinery in mills and steel works may not immediately yield large profits, but will gradually enable us to turn out a more regular product, and largely to increase the quantity produced per man employed, therefore enabling us to pay better wages and to employ a smaller number of men.

7. The specialization and the standardization of our products will introduce economies and place us in posi-

tion to meet on their own level the invaders of our markets.

8. By combining with our neighbors in the same line of business we may form economical selling and distributing agencies for our product. At the same time as they obtain for us the best possible price, these combinations will prevent us from an unlimited and unreasonable competition among ourselves.

9. The training of the managers and engineers of the future should be done, not only by the antiquated apprenticeship system, but also in the best elementary and technical schools that can be created for the purpose.

10. The iron industry, more than any other, will feel the need of some protection, especially during the period of gradual reconstruction which is ahead of us. There seems to be a growing public opinion, at least among the industrial classes, in favor of such protection. This should be fostered by all honorable means, until legislation can be secured to prevent the steel manufacturers of Great Britain, while practically excluded from foreign countries, from having their own territory, without compensation, laid open to foreign imports.

Many of these suggestions will, undoubtedly, seem to you to be drastic and difficult of adaptation, but I do not need to remind you that you are the representatives of the race which built this Empire, and that you are sons and grandsons of the men who created your great iron and steel industry out of nothing. The task before you is not so great as was theirs. If you, taken as a body, during the past couple of decades, have gradually permitted younger nations somewhat to get ahead of you in hard study, in vigorous business application, in generous investment of money in manufactures, that, surely, is not because you are not capable of doing what they have done, but rather because you have not hitherto really and keenly felt the necessity for so doing. It is my conviction that this necessity is now before us, and that you are capable of meeting the situation, as have always done your forefathers before you.

The East Chicago Mills.

CHICAGO, ILL., May 6, 1903.—The East Chicago mills of the Republic Iron & Steel Company have been closed, resulting from labor difficulties, but fortunately the company have the Springfield plant ready for operation and work was commenced there on May 5. This mill has been brought to a high state of mechanical efficiency by recent improvements, and it is thought that these mills are now the best of the company's in service.

The Muskegon mills of the American Rolling Mill Corporation have also been shut down.

Gas engines for small powers, such as driving printing presses in country offices and machine shops, are coming into use rapidly. A jobbing machine shop, which required about 6 horse-power, was run by steam, but the boiler giving out it was resolved to try a gas engine. The cost of coal and attendance with steam was slightly over \$5 per week, while with gas, even at \$1.25 per 1000 feet, the expense was only \$3.25 per week, with no cost for attendance.

According to a foreign technical paper very good "lemonade" can be made from sea water by the use of citric acid, which precipitates the salt, the remainder being a harmless mineral water. Seven ounces of citric acid will supply one man with marine lemonade for one week. Persons about to be shipwrecked should provide themselves with this prescription.

A general rule, in the absence of a controlling statute, is that in extra hazardous occupations employees assume all the risks incidental thereto, even those incurred by the co-operation of fellow workers, whether through carelessness or inattention.

By act of the Board of Directors the name of the Fort Wayne Foundry & Machine Company has been changed to the Chicago Car Wheel & Foundry Company, effective May 1.

Notes from Great Britain.

The Budget.

LONDON, April 25, 1903.—The great event of the week has been the budget statement made by the Chancellor of the Exchequer on Thursday last. In its way this budget is historic for two reasons: First, because it marks the first reduction in taxation after a long and exhausting war, and, second, because it reverses the policy of broadening the basis of taxation adopted by the previous Chancellor of the Exchequer last year. This budget will be remembered because it reduces the income tax by 4 pence in the pound, and abolishes the corn tax, which last year was ushered in as being the first step toward that broadening of taxation to which I have alluded.

I doubt if the average American has any idea of the extent to which we are taxed in this country, and of the burden the business man must perforce bear. A bird's-eye view of the budget will perhaps make this clear. Here, then, is a statement of our estimated income and expenditure for the coming financial year:

Income.	
Customs	£36,640,000
Excise	32,700,000
Death duties.....	13,300,000
Stamps	8,400,000
Land tax and house duty.....	2,600,000
Income tax.....	39,000,000
Post office.....	15,300,000
Telegraphs	3,800,000
Crown lands.....	445,000
Suez Canal shares, &c.....	935,000
Miscellaneous	1,650,000
Total.....	£154,770,000

Expenditure.	
Consolidated fund services.....	£30,296,000
Army	34,500,000
Navy	34,457,000
Civil service.....	26,561,000
Custom and inland revenue.....	3,113,000
Post office.....	10,068,000
Telegraph services.....	4,549,000
Packet service.....	787,000
Total.....	£144,331,000

It will therefore be seen that the estimated income, on the basis of taxation for last year, shows a surplus of over £10,000,000.

The £144,000,000 which we shall spend upon imperial taxation during the coming year represents probably only about half of our public expenditure. Municipal rates will account for the other half. On our incomes by indirect taxation, or by municipal rating upon the value of our land, we are spending every year not far short of £300,000,000—surely a stupendous financial burden to carry. That most of this is inevitable goes without saying, but the £70,000,000 spent upon our army and navy is a heavy clog upon the wheel of progress.

The Markets.

The feature this week has been the slump in pig iron. Scotch warrants last Saturday stood at 54 shillings. They are quoted to-day at 53 shillings 3 pence, and during the week have been as low as 52 shillings 10 pence. Middlesbrough warrants a week ago stood at 49 shillings 3 pence, to-day they are 48 shillings 5 pence. The market throughout the week has been sluggish, with a distinct downward tendency. This sudden change is ascribed entirely to reports from America. There is a feeling over here that, so far from America buying much more from this country, it will not be long before American pig iron and the more finished products are marketed here. In short, many large buyers and sellers think that the American boom has reached its fullest expansion and now shows some indications of contraction. The result of this has been some hope that the easier prices of pig iron would act beneficially upon the finished iron branches and secure to these branches what they have long hoped for—namely, some margin of profit.

It is open to doubt, however, whether the lower pig iron prices will operate in favor of the finished iron makers, for the simple reason that the consumers are still clamoring for reductions and are still buying from hand to mouth. A few weeks ago, it is true, there was some little boom in forward contracts, and, as a matter of fact, many makers are still busy on specifications then se-

cured. But the consumer has gone back to the hand to mouth policy, and if he plays the game long enough the maker finds him insatiable.

At the Midland iron meeting, held on Thursday, prices were a shade easier all round, an average reduction in price of 6 pence being a fair estimate. Although the Germans are still completely off the market, Belgian competition is again making itself felt, the bulk of the imported material being 5 shillings below local prices. Prices to-day are as follows:

Pig Iron: Scotch warrants, 53 shillings 3 pence; Middlesbrough warrants, 48 shillings 5 pence; forge qualities: Staffordshire cinder, 49 to 50 shillings; part-mine, 50 to 51 shillings; all-mine, 57 shillings 6 pence to 67 shillings 6 pence; best ditto, 80 to 85 shillings; cold blast, 95 to 100 shillings; Northamptonshire, 49 to 51 shillings; Derbyshire, 50 shillings 6 pence to 51 shillings 6 pence; North Staffordshire, 51 to 52 shillings; Lincolnshire, 54 shillings 7 pence.

Public stores stocks, Thursday, April 23: Tons.
Connal's, at Glasgow..... 18,269
Connal's, at Middlesbrough, hematite..... 800

Hematite, April 22:
West Coast..... 26,100
Connal's, at Middlesbrough..... 137,416
Finished Iron: Marked bars, £8 10s.; Earl of Dudley's brand, £9 2s. 6d.; second grade, £7 10s.; common unmarked bars, £8 5s. to £8 10s.; North Staffordshire bars, £6 15s.; angles, £6 15s. to £7; sheets, singles £7 10s. to £7 12s. 6d., doubles £7 12s. 6d. to £7 15s., trebles £8 5s. to £8 7s. 6d.; galvanized corrugated sheets, f.o.b. Liverpool, £11 10s.; hoop iron, £7 5s.; nail rod and rivet iron, £7 5s. to £7 10s.; gas strip, £6 12s. 6d. to £6 15s.

Steel: Bessemer billets, £4 17s. 6d. to £5; Siemens billets, £5 to £5 2s. 6d.; mild steel bars, £6 12s. 6d. to £7 2s. 6d.; steel plates, £6 5s. to £7; steel girders, £6 to £6 5s.; steel angles, £5 15s. to £6 7s. 6d.

Profits, Losses and Dividends.

The report of the Shelton Iron, Steel & Coal Company is not exhilarating. They report a loss on the year's working of £154,000, together with £15,750 required for debenture service, which has been met by a transfer from the general reserve, which is now down to £9000. This loss is almost entirely due to new developments in the collieries owned by the company. The borrowing powers of the company amount to £300,000, and as these powers have been exhausted, the directors have asked the shareholders for power to borrow £100,000 more, in order to meet the needs of the present situation.

Clayton & Shuttleworth, Limited, report a profit of £60,191, compared with £46,851 the previous year. Clayton & Shuttleworth are famous for their agricultural machinery. For many years they have had a large factory in Vienna, capable of manufacturing many of the numerous articles the firm sold in those parts, and plans have been prepared for erecting and equipping a factory capable of manufacturing the engines and machines required by the Continent. The directors have also thought it advisable for the future of their business in Russia, with its protective duties, to secure a material interest in the firm of Hofferick Sadek at Charkow.

The Tharsis Sulphur & Copper Company pay a dividend of 15 per cent., compared with 20 per cent. the year previous. This is due to the fall in the average market price of copper. The company have been 36 years in existence, and during that time have distributed among their shareholders no less than £7,633,432, an average annual dividend of over 19 per cent., and have accumulated a reserve large enough to acquire a new mine at any time.

Willans & Robinson pay a dividend of 8½ per cent. The company during the year were very successful in obtaining orders for large engines, but prices have not been so remunerative as formerly, with the result that the dividend has gone down compared with the previous year 1½ per cent. The orders for Willans engines in 1902 exceeded by 2000 horse-power those of any previous year. The company have succeeded in making boiler tubes, and the staff are confident of success in drawing the large tubes required for the headers of the boilers. They have again taken up the manufacture of their own steel for the tube works to avoid paying the high price demanded for Swedish steel.

Robert Stephenson & Co., Limited, engineers and ship-builders, have had a loss on last year's working of £31,000, of which £23,000 was lost on the locomotive works, which the manager attributes to the transfer of machin-

ery and labor difficulties. Further loss is attributed to the treacherous foundation of the company's new graving dock at Hebburn, which is to be completed by next December.

Bell Bros., Limited, the well-known ironmasters of Middlesbrough, made last year a profit of £129,730, an increase of £46,726. Sir Lowthian Bell makes the significant remark that this increased profit was not due to any improvement in the selling price of iron, but to the advantage gained by the reduced cost of materials and reduced wages.

The Iron and Steel Institute.

The approaching meeting of the Iron and Steel Institute bids fair to be unusually interesting, for the presidential address is to be delivered by Andrew Carnegie, and Sir James Kitson will receive the Bessemer medal for 1903. Sir James Kitson was president of the institute from 1888 to 1890. The autumn meeting will be at Barrow-in-Furness, and a committee has already been formed to make arrangements. The Duke of Devonshire, chairman of the Barrow Hematite Company, will act as chairman.

A Great Pumping Scheme.

The Mines Drainage Commission decided at their last meeting to spend £70,000 in the provision of additional pumping power. It is hoped that as a result they will release something like 40,000,000 tons of coal at present submerged in the district of Staffordshire and East Worcestershire. The district in which operations are contemplated includes Tipton, Wednesbury and Bilston. The scheme, if successful, will add enormously to the economic value of the Midlands. The Commission have given the matter consideration for many years, but it is only recently that they have been able to overcome the difficulty of raising the money. With reasonable success mining in this district should become prosperous.

The Training of Engineers.

With reference to some previous comments of mine upon the training of engineers, I commend to the notice of those who desire to train their apprentices scientifically as well as practically an arrangement made by D. Drummond, the locomotive engineer of the London & Southwestern Railway. Having heard that this gentleman had taken action on his own initiative in his own works at Nine Elms, London, I have procured a copy of the notice to apprentices, from which the following extracts are taken:

I am anxious that the apprentices in the London & Southwestern Railway works at Nine Elms should have every possible opportunity afforded them of having a scientific education, arranged to go hand in hand with their practical every-day work, and so enable them to prepare, at the end of three years, to take up the higher scientific training to be obtained at the technical colleges during the last two years of their apprenticeship. The course will commence in October and end in February.

I have arranged for a competent teacher to give one hour, from 8 to 9 a.m., on three mornings of the week for juniors, and one hour two mornings of the week for seniors, which will form part of the day's work. You will be expected to pass a preliminary examination in proportion, fractions, cubic and square root and mensuration, before being allowed to join the classes.

At the end of three months in each term an examination will take place to enable me to ascertain what progress has been made; the final examination to take place at the end of each term. Those who pass the final examination will enter the higher class for the second year, and so on to the third.

Those who fail to pass the first examination, but receive from their teacher a recommendation, will have the privilege of continuing in the same class another year to give them the opportunity of passing into the higher classes. Those who do not receive a certificate from the teacher, or who fail at the second opportunity of passing, will have to retire from the classes. I will arrange for those who fail not to work overtime during the winter months, so as to enable them to attend evening classes if they so desire.

The apprentices who pass all their examinations satisfactorily will be allowed to attend the engineering colleges during the winter months to secure a higher education, and the time so occupied will be counted as part of their apprenticeship, and those who successfully pass the college examinations will have the privilege of entering the drawing office or the chemical laboratory during the summer months. This privilege will continue for the last two years of their apprenticeship.

Those whose conduct is satisfactory, and who have shown ability both in workshops and in technical work, shall have the first call for promotion. I therefore hope that every apprentice will do his utmost to improve his knowledge and so become eligible for promotion.

Any lad whose parents have not had the means to keep him

sufficiently long at school to give him an education such as would qualify him to pass the preliminary examination will call upon me, and I shall endeavor to make such arrangements as will enable him to acquire the necessary knowledge to do so. The directors have kindly agreed to pay the teacher's fees for the first three years.

A Hint Worth Taking.

In consequence of a dispute over a burst boiler the British Admiralty has issued orders at the various dockyards that all boilers condemned must, before sale as scrap iron, be absolutely mutilated, in order to prevent any chance of their being done up and resold to unsuspecting purchasers. From inquiries recently made it is proved that a large trade in these condemned boilers has been done.

S. G. H.

MANUFACTURING.

Iron and Steel.

The new Low Moor Furnace of the Low Moor Iron Company, Low Moor, Va., will probably be blown in on or about July 1.

The Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, have appointed A. M. Baird of Topeka, Kan., formerly foreman boiler maker in the shops of the Santa Fe Railway, to represent their interests in that vicinity. He is the inventor of a number of compressed air tools, among them the well-known Baird staybolt nipper. The company state that the demand for the Falls hollow staybolt iron is increasing rapidly and that this product has been specified in a number of recent large orders for new locomotive equipment. Their hollow staybolt steel has also been specified in a number of recent Government contracts, among them boilers for the new lighthouse tenders "Magnolia" and "Ivy," to be built by the Baltimore Ship Building Dry Dock Company.

The Pennsylvania Steel Company have sent a force of men from their Steelton plant to Cornwall, Pa., where they are building coke ovens that will cost about \$800,000. The ovens will be completed within the coming year, it is expected, as the money for them has already been provided and the work on them will be pushed. Much of their coke will be transported to Steelton by way of the Reading Railroad, which will increase its railroad facilities at Steelton in order to take care of the increased traffic.

The Tidewater Steel Company of Chester, Pa., have made a contract with the National Tube Company to supply about 20,000 tons of steel skelp which is to be used at the Chester department at South Chester, Pa., which is to be started up again.

The Worcester Steel Works property, at Worcester, Mass., has been sold under a mortgage to John A. Bowers of Bayonne, N. J., for \$120,000. The plant has been idle for years excepting one part of it which is occupied as a foundry by the Morgan Construction Company. No plans have been made for the future of the works and the 5 acres of land upon which they stand.

The Frankford Steel Company, Frankford, Philadelphia, are to put in a new 16-inch roughing mill and a 9-inch guide mill. The various improvements to their plant previously mentioned are progressing favorably. This company, when extensions are completed, will roll all classes of high grade crucible steel suitable for files, tools, shears, &c.

The second stack of the Lehigh Steel & Iron Company of Allentown, Pa., will be put in blast within ten days. The stack has been out of service for some time for cleaning and repairs.

The Eastern Steel Company of Pottsville, Pa., expect to complete their new steel mill by August 1, and the 19-inch rolling mill will be put in operation at the same time. The steel mill building, which is 90 x 280 feet, only lacks the roof to be completed. Two cranes, 90 and 15 tons capacity respectively, will be installed. The foundation for one new open hearth furnace in the steel mill has been completed and the second furnace is half completed. The 23-inch mill furnaces are complete and work has been commenced on the large stack that will supply the draft.

The old blast furnace of the Duncannon, Pa., Iron Company is being torn down by the Pennsylvania Railroad Company, who bought the ground on which it stands some time ago.

President Joseph Wharton of the Andover Iron Company, Phillipsburg, N. J., announces that the furnace at that place which is being rebuilt will be put in blast June 15. The force of men at the plant has been increased and will work night and day during May.

Charlotte Furnace of Corrigan, McKinney & Co., at Charlotte, N. Y., will be banked for a few days to connect up two new stoves, new boilers and new blowing engine.

Cherokee Furnace of the Alabama & Georgia Iron Company, at Cedartown, Ga., blew in April 26, after extensive repairs.

General Machinery.

Wm. Ganschow, Chicago, early in May will remove from his Canal street quarters to a new shop and office building which

is being completed at 12 and 14 South Clinton street. New machinery has been purchased and facilities will be largely increased.

G. W. Marsden has resigned as treasurer and general manager of the Rock River Machine Company, Janesville, Wis., and organized the Badger State Machine Company, now located in a new plant at Janesville. A full line of punching and shearing machines for both hand and belt power will be manufactured. Some improvements will be introduced in this line of manufacture of interest to the trade.

The Geiser Mfg. Company of Waynesboro, Pa., have received an order for a large size thresher and straw blower and traction engine from the Khedive of Egypt, to be used on a farm in the Nile Valley. The Khedive has given assurance of future orders if the machinery now ordered proves satisfactory. The Geiser Company have made large shipments of farming implements to H. G. Nergerarian & Co. of Constantinople, Turkey.

William H. Baker, Trenton, N. J., engineer and machinist, has recently completed a two-story addition, 32 x 50 feet, on street front, with two-story L running back 32 x 54 feet; new boiler house, 20 x 40 feet; engine room, 20 x 20 feet, and two-story storehouse. The new additions are to relieve the cramped conditions of the old shop, which is two stories, 50 x 100 feet, and will be used for drawing room, pattern shop, smith shop, erecting and machine room. A new 60 horse-power boiler and 30 horse-power engine have been installed.

Four new molding machines have been added to the plant of the Sharpless Separator Works of West Chester, Pa. They weigh about 4 tons each.

The Gowland Mfg. Company, Phillipsburg, Pa., recently organized with a capital stock of \$40,000, have purchased the plant formerly owned by Mathew Gowland, and are erecting new buildings for the manufacture of mill and mining machinery. These will comprise a machine shop with 2800 square feet of floor space; foundry, 2200 square feet of floor space, and blacksmith shop, 2200 square feet of floor space. The officers are: Jacob Swires, president; Joseph Swires, treasurer, and John Gowland, secretary and general manager.

The Geo. A. Hogg Iron & Steel Foundry Company, Pittsburg, have about completed plans for the removal and enlargement of their foundry and machine plant, making all kinds of rolling mill machinery. One of the important new lines which the company will enter is the manufacture of blowing engines. A site is under option at Carnegie, Pa., but has not been closed for.

Power Plant Equipment.

Two tubular boilers of 60 to 70 horse-power, 8 and 10 inch spiral riveted pipe, pumps, steam shovels, tram cars and 20 and 40 pound steel rails are required by the Napier Iron Works, Nashville, Tenn., who will install a modern ore crusher at a recently acquired ore property. The expenditure will amount to \$60,000.

The Shreveport & Red River Valley Railway Company, Shreveport, La., are rebuilding their shops and round house, which were recently damaged by fire. No new equipment will be required, as no machinery was damaged beyond repair.

J. M. Lewis, city engineer, Sioux City, Iowa, informs us that the extension of the water works plant will consist of a new station to contain two 3,000,000-gallon pumps and three 120 horse-power boilers, one sub-station with two 250,000-gallon pumps and stand pipe, two miles 16-inch main, 1½ miles 12-inch main, together with hydrants, valves, &c. The total estimated cost is \$250,000.

The firm of Rocho & Nicholson, operating the Boone Boiler & Iron Works, Boone, Iowa, have been dissolved, W. F. Rocho purchasing the interest of Chas. Nicholson. Mr. Rocho will hereafter conduct the business under his individual name.

The Brown Corliss Engine Company, Corliss, Wis., have just received an order from the Pfister & Vogel Leather Company, Milwaukee, for a 28 x 48 inch heavy duty Corliss engine; also an order from F. R. Payne of Williams, Iowa, for a 12 x 30 inch Corliss engine.

Mayor C. F. Schumacher, chairman of Water Committee, Tucson, Ariz., will receive bids until May 20 for a cross compound crank and fly wheel high duty pumping engine of 4,000,000 gallons daily capacity.

Work will be started this week on the erection of a new main building to replace that recently destroyed by fire at the works of the Harrisburg Boiler & Mfg. Company, Harrisburg, Pa. Delayed shipments of structural iron have held back the work.

The Buffalo Gasoline Motor Company have moved their establishment to their new building, corner of Niagara street and Auburn avenue, Buffalo.

Foundries.

The Browning Engineering Company, Cleveland, Ohio, are in the market for semisteel castings.

The Manufacturers' Foundry Company, Waterbury, Conn., makers of gray iron and brass castings, have plans ready for a new foundry. It will be a brick structure, about 80 x 400 feet.

The Philadelphia Foundry & Machine Company, Philadelphia, Pa., were incorporated under the Pennsylvania laws on May 1. The capital stock is \$75,000, full paid. Emil Guenther, the former proprietor of the plant, retains a majority interest in the new company, the directors and officers being as follows: Emil Guenther, president and treasurer; H. S. Roberts, secretary; C. M. Guenther and W. A. Hindle. The company have just completed a most successful year, contracts having been consummated for over 8000 tons of castings. Improvements to their plant are now under consideration; a new foundry building, 60 x 120 feet, particularly adapted for loam work, is to be erected and equipped, and many improvements made to other parts of the plant. These when completed will give them a daily capacity of fifty tons of castings. One of the contracts just completed was for 800 standard Pennsylvania Railroad type locomotive cylinders, together with a large number of smaller castings for the Baldwin Locomotive Works.

The American Locomotive Company, New York, contemplate the erection of a large steel casting plant at their Brooks Works, Dunkirk, N. Y.

Bridges and Buildings.

Details of the new bridge building plant now being erected by the Milwaukee Bridge Company on a 17-acre site in Milwaukee, Wis., are at hand. The plant is located on the Northern Division of the Chicago, Milwaukee & St. Paul Railroad, and is being built of brick and steel. There will be a main shop, 130 x 288 feet, with office building and power house attached, the equipment for which has been purchased. It includes a 150 horse-power high speed Skinner engine, direct connected to 100-kw. generator; 10-ton Pawling & Harnischfeger electric crane, and enough of the usual bridge shop machinery to make a start. The company expect to begin manufacturing July 1, and be in thorough working order before the end of the year. The present capitalization is \$125,000.

Fires.

The plant of the Penn Facing Mill Company, Irwin, Pa., was destroyed by fire April 30, entailing a loss of \$20,000.

The shops of the Russian Locomotive & Gun Works, Khar-koff, Russia, were burned May 2. The loss is placed at \$500,000.

The tannery of C. A. Mueller, Port Washington, Wis., was destroyed by fire May 2, causing a loss of \$50,000.

The municipal lighting plant at Kennebunk, Maine, was destroyed by fire May 2. The plant was valued at \$35,000.

The plant of the Round Top Hydraulic Cement Company, Hancock, Md., was burned May 3. The loss is about \$30,000.

The machine shop of the A. S. O'Neill Company, Los Angeles, Cal., was recently damaged \$6000 by fire.

The extensive plant of the Crescent Powder Company, at Ganister, near Hollidaysburg, Pa., was wrecked by an explosion April 29.

Hardware.

The American Bolt & Screw Case Company, Dayton, Ohio, manufacturers of revolving cases for bolts, screws, printers' sorts, bicycle repairs, tools, &c., state that their business for 12 months past, both foreign and domestic, has been exceedingly good, in fact beyond their facilities. In consequence of this they have enlarged their manufacturing plant over 100 per cent. and are now in position promptly to take care of all orders received. A new field of trade has been opened up with machine tool builders, pattern shops, &c., the cases having been found very convenient for use in such establishments.

The Coiled Wire String Company, Chicago, have been organized with a capital stock of \$50,000 to manufacture toys and novelties, the incorporators being C. O. Brown, D. T. Nelson and E. G. Seip. The company have taken over a plant already in existence.

The American Machine Wrench Company, Denver, Col., have been incorporated under the State laws of Colorado with a capital stock of \$100,000, fully paid and nonassessable. The officers of the company are: Jos. Johnson, president and treasurer; N. F. Adamson, vice-president, and C. J. Coulter, secretary and manager. The company have acquired the letters patent for the Coulter & Adamson machine wrench, especially designed for railroad construction and repair work.

W. B. Bertels, Son & Co., manufacturers of tinware, Wilkes-Barre, Pa., are about to commence work on a number of additional buildings, which will materially increase their facilities and output. These include a three-story brick structure, 75 x 150 feet, the concrete first floor to be used as a pressroom and machine shop; the second floor to be used for tin plate lithographing, principally for lard pails; and the third floor for storage. Also a fire proof brick building with cement roof, 25 x 100 feet, for storage of tin plate, and brick office building, 25 x 43 feet, fitted with a large fire proof vault. They will also build an addition to their present shipping rooms, 30 x 75 feet, two stories high. Besides additional wagon sheds, they are encircling their entire plant with an eight-foot tight board fence. A new railroad switch is another improvement. These additions will of course call for the installation of a good deal of new machinery.

Business with the Oliver Ames & Sons Corporation, North Easton, Mass., has of late years increased so materially that with existing trade conditions it has become necessary for them to enlarge their plant. This enlargement will be completed in about a year, when they will be in a position to supply the needs of their customers with promptness.

Fred. T. Brosi Company, manufacturers of galvanized and japanned ware and sheet metal specialties, Quincy, Ill., have lately enlarged their plant one-third and are now manufacturing a line of pieced tinware in addition to their former products. The prospect for business for the remainder of the year is regarded as very favorable.

The Cromwell & Patterson Mfg. Company, of Bridgeport, Conn., manufacturers of piano and organ hardware specialties, are to build still another addition to the factory. It will be 50 x 100 feet and one story high. An addition 60 x 216 feet is already building.

Miscellaneous.

The Chicago Bridge & Iron Company, Washington Heights Station, Chicago, have secured a contract for the erection of a 160,000-gallon water tower at Marshall, Texas, to be 80 feet above ground. The contract price is \$10,000. The work is to be completed by October 15.

The Keenan & Hyland Mfg. Company, a reorganization of the Keenan Bros. Mfg. Company, have purchased a site at the northwest corner of Campbell avenue and Taylor street, Chicago, 134 x 627 feet, running to the right of way of the Pan Handle Railroad, upon which they will erect a large plant. The property is connected with the Chicago Terminal Railroad by a switch track crossing Taylor street. Four buildings will be erected, each four stories and basement, 100 x 120 feet, providing a floor area of 240,000 square feet. The estimated cost of the buildings is \$150,000. The plans will be prepared by D. E. Postle. The buildings will be electrically equipped and lighted and sprinkled throughout. The company manufacture bank, store, office and bar fixtures.

The Sterlingworth Railway Supply Company of Easton, Pa., have had recorded in Media, the county seat of Delaware County, Pa., a deed for 104 acres of land of the Denis estate, Eddy-stone, where they are to erect their steel car plant. The price paid was \$98,000.

The Charles H. Johnson property on Whiting street, Plainville, Conn., has been sold to L. H. Carter and W. W. Seymour, who will establish a brass foundry at the plant. It is understood that additional buildings will be erected.

The Bessemer Iron Ore Company have been chartered in New Jersey with a capital stock of \$50,000, to mine the hematite ore in West Nottingham township, Chester County, Pa.

The Sheldon Axle Company of Wilkes-Barre, Pa., have purchased the ball bearing works adjoining and will incorporate the addition under the name of the Empire Ball Bearing Company. The purchased plant has been operated separately for several years, most of the product, consisting of ball bearing axles and gears, being taken by the nearby axle works. The incorporators are E. H. Jones, Charles H. Gillam, C. E. Roberts and W. B. Pearson, all of Wilkes-Barre, Pa.

The Risdon Iron Works of San Francisco, Cal., have secured the contract for the construction of 2000 tons of steel pipe for the new water power plant being built on the Puyallup River near Tacoma, Wash., by the Pierce County Improvement Company. This is said to be the largest order for pipe ever placed on the Pacific Coast.

The Worcester Emery Wheel Company are moving into their new factory at 326 Chandler street, Worcester, Mass. The building is 50 x 100 feet and three stories high. The power plant is located in a separate building. The company began business about a year ago, and the growth has been so rapid that larger quarters became an imperative necessity. They manufacture silicate and abrasive wheels of emery, corundum and abrasive corundum, of all patterns, and for all of the makes of grinders and grinding machines. The company pay especial attention to the testing of their wheels, which are subjected to the strain of revolution at the rate of 9000 feet per minute. The officers are: President, Dr. A. E. P. Rockwell; vice-president, J. J. Torpey; secretary and manager, Arthur D. Putnam, and treasurer, Dr. John W. McKeon.

The Hampden Corundum Wheel Company are now occupying their new quarters at Springfield, Mass., and as a result the capacity has been largely increased.

The Pennsylvania Stove Company, composed of men formerly connected with the Pittsburgh Stove & Range Company, have started up a stove plant at Ellwood City, Pa. They will employ 150 to 200 men and the capital will be over \$100,000.

The Glen Mfg. Company of Ellwood City, Pa., recently organized to manufacture wire goods, have decided to enlarge their plant, and they are now increasing their capital stock for this purpose.

The San Bernardino & Highlands Electric Railway Company, San Bernardino, Cal., have purchased the San Bernardino & Arrowhead Railroad, which they are now reconstructing, to be operated by electricity. The officers are Henry Fisher, presi-

dent, A. C. Denman, vice-president and general manager; E. D. Roberts, treasurer, and G. B. Ellis, secretary.

The Lake Street Elevated Railroad, Chicago, is preparing to construct a transformer station at Lombard avenue and Lake street. The estimated cost is approximately \$75,000. The company purchased the land some years ago. Plans, which are being completed by W. C. Zimmerman, provide for a building three stories high, 40 x 100 feet, to be constructed of pressed brick and stone.

The Enamel Steel Tile Company of Bellaire, Ohio, whose large plant was recently destroyed by fire, have rebuilt and equipped their factory with new and modern machinery and are again in excellent condition to interest the trade. The company will manufacture enamel steel tile for wainscoting bathrooms, side walls, ceilings, mantels, hearths, &c., and will in addition to manufacturing this line of goods be in position to execute orders for special enameling. The officers are J. F. Du Bois, president; W. A. Landkrohn, manager, and J. W. Garber, secretary and treasurer.

Dallett & Co. of Philadelphia, have recently received a contract for furnishing the electrical equipment for new cars of the Allentown & Reading Traction Company.

E. B. Seidel, formerly proprietor of the Tacony Crucible Works, Tacony, Philadelphia, Pa., has assumed the management and will make extensive improvements to the plant of the Taunton Crucible Works, Taunton, Mass.

The Bassett-Presley Company of Cleveland, dealers in iron and steel and supplies, are completing one of the largest warehouses of the kind in the country. It is located on Clifton street, between Superior and St. Clair streets, adjoining the Pennsylvania Railroad. The building is of brick and steel, 150 x 360 feet, and three stories high. The site also includes a space 80 x 160 feet for yards and an office building. Work on the latter is to start at once. This will be a two-story structure, 30 x 50 feet. The site chosen is in the heart of the great East End manufacturing district, in which are located nearly all the leading factories. In addition to their usual line of bar iron, angles, tin plate, sheet, tubes, rivets, &c., the company will install a line of tinners' supplies, such as sheet, copper, solder, &c., and they will also add later a very complete line of telephone supplies, such as wire, insulators, &c.

The principal output of the Central Electric & Mfg. Company, recently organized at Youngstown, Ohio, to build a plant at Struthers, will be an automatic car weighing apparatus which will be capable of weighing and recording the weight of each successive car in a train moving at an ordinary rate of speed. A feature of this device is that the scales can be located at any place and the record can be carried a long distance. This is an invention of Edward McGarvey, who is a large stockholder.

The Conrad Motor Carriage Company of Buffalo, N. Y., have increased their factory facilities by leasing 30,000 square feet of floor space in a new four-story building adjoining their plant on Niagara street. The whole plant is running 22 hours per day.

The stockholders of the Wolfe-Englert Composite Metal Company of Catasauqua, Pa., held a meeting on Tuesday, April 28, and elected the following officers and directors: President, Jacob Miller; vice-president, John Harris; secretary, Louis K. Englert; treasurer, Theodore J. Geiger; general manager, Jacob S. Wolfe; directors: Jacob Miller, Jacob S. Wolfe, Theodore Geiger, D. G. Dery, Harry Sheldon, Ralph Lupton and John H. Harris. It was decided to build new works on the tract of land recently purchased from the Kurz estate in Catasauqua. The building will be of brick and stone and will be 60 x 100 feet. The corporation manufacture tempered copper castings, and their business has grown to such extent that the old plant cannot handle it.

Nolan Brothers, contractors, have completed and turned over to the American Conduit Company the new manufacturing plant of that corporation at Fourth and Booth streets, Chester, Pa. The machinery of the plant was operated for the first time last week, when samples of the product the company will make were turned out. The works will be operated continuously, a large number of orders having already been booked.

The Petit Ornamental Fence Company of Ambler, Pa., will be succeeded by another corporation, the Cruse-Kemper Company. The capital is \$150,000, divided into 1500 shares of \$100 each. The company will manufacture gas holders, oil and water tanks, steel water towers and light structural steel work in general.

The Sessions Clock Company, Forestville, Conn., have purchased some adjoining property, upon which they expect to erect two moderate sized buildings, plans for which are not yet ready.

The Byram Foundry Company, Indianapolis, Ind., have reached an agreement with their molders by which the scale paid will be practically that agreed upon between the National Founders' Association and the Iron Molders' Union of North America. The molders are to receive double time for legal holidays and time and one-half for overtime. The scale is to be effective until April 1, 1904.

The Iron and Metal Trades.

The Foundry Iron market in many respects is the best guide to the condition of the Iron market, because it is almost entirely free. The United States Steel Corporation is a minor factor, and there are numbers of producers and thousands of consumers whose products go into very many channels. There is a mild form of co-operation among some of the large Southern furnace interests, but there are a number of outside independent producers in that section, while all other districts act freely, so that the influence of concerted action is not very strong.

Now there has practically been a deadlock between consumers and producers, the former holding off persistently, while some of the latter have been steadily weakening. This week records another gain on the part of the melters, since a number of outside Southern furnacemen have come down squarely to the basis of \$16 for No. 2, Birmingham, while the leading furnace interests are still holding at \$17.50. Some moderate business has been done on the basis of the lower prices.

The interesting event of the week, however, has been the closing of a contract by the Pullman Company of Chicago for 25,000 tons for delivery during a part of the second half of the year. Our Chicago representative telegraphs that the order was taken by a Northern furnace company at the reported price of \$19.50 for No. 2 and \$19 for No. 3, which is lower than the \$16, Birmingham, basis. The transaction is interesting, as showing at what figure large consumers will take hold, and is the first serious indication that the deadlock may be soon broken. There can be no doubt that founders have failed to cover new business taken for a considerable period, so that there must be a very large amount of tonnage to be placed when the movement does begin.

Sellers, both of domestic and foreign Foundry Pig, complain that founders are making frequent and urgent demands for the cancellation of orders, in some cases justified by the fact that deliveries are past due.

While the Foundry Iron market is weak, the demand for Basic Iron is pretty strong. In Bessemer Pig the Central West shows a somewhat unsettled market, with a downward tendency.

In the Central West and in the Chicago district the Steel market is strong, although complaint is made that importers are being helped to regain a footing by special rates of freight. At tidewater foreign Steel is being offered at \$28.50, duty paid, while domestic Steel has been quoted at \$28, at Steel mill.

Reports from the Wire trade continue very good. In the Steel Bar trade Chicago notes a revival of business. In other finished lines tonnage is still satisfactory.

About 20,000 tons of Steel Skelp have been sold in Eastern Pennsylvania. A Tube mill is starting up which has been idle for some time.

In the West there have been some large transactions in Cast Iron Pipe, Minneapolis contracting for 45,000 tons, Kansas City for 4500 tons and Indianapolis for 6000 tons.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

	May 6, 1903.	Apr. 29, 1903.	Apr. 8, 1903.	May 7, 1902.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	\$21.00	\$21.25	\$21.00	\$19.75
Foundry Pig No. 2, Southern, Cincinnati	19.25	19.75	20.25	17.75
Foundry Pig No. 2, Local, Chicago	21.50	22.80	22.50	20.00
Bessemer Pig, Pittsburgh	20.10	20.35	21.85	20.75
Gray Forge, Pittsburgh	20.00	20.25	20.50	19.75
Lake Superior Charcoal, Chicago	24.50	25.00	25.50	22.50

BILLETS, RAILS, ETC.:

Steel Billets, Pittsburgh	31.00	30.00	30.00	33.00
Steel Billets, Philadelphia	*29.50	*28.50	33.50
Steel Billets, Chicago	32.60	32.75	31.50
Wire Rods, Pittsburgh	37.00	37.00	37.00	37.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00

OLD MATERIAL:

O. Steel Rails, Chicago	18.50	18.50	18.50	17.50
O. Steel Rails, Philadelphia	21.50	21.50	21.50	21.00
O. Iron Rails, Chicago	24.50	24.50	24.50	24.00
O. Iron Rails, Philadelphia	24.50	25.00	25.00	26.00
O. Car Wheels, Chicago	24.00	24.00	24.00	20.00
O. Car Wheels, Philadelphia	24.00	24.00	24.50	19.50
Heavy Steel Scrap, Pittsburgh	21.50	21.50	21.50
Heavy Steel Scrap, Chicago	18.50	18.50	18.25	17.50

FINISHED IRON AND STEEL:

Refined Iron Bars, Philadelphia	1.93½	1.93½	1.93½	1.92
Common Iron Bars, Chicago	1.85	1.80	1.85	1.90
Common Iron Bars, Pittsburgh	1.89¾	1.85	1.85	1.80
Steel Bars, Tidewater	1.75	1.75	1.75	1.80
Steel Bars, Pittsburgh	1.60	1.60	1.60	1.60
Tank Plates, Tidewater	1.89	1.85	1.85	1.95
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.60
Beams, Tidewater	1.73½	1.73½	1.75	2.00
Beams, Pittsburgh	1.60	1.60	1.60	1.60
Angles, Tidewater	1.73½	1.73½	1.75	2.00
Angles, Pittsburgh	1.60	1.60	1.60	1.60
Skelp, Grooved Iron, Pittsburgh	2.05	2.05	2.00	2.25
Skelp, Sheared Iron, Pittsburgh	2.10	2.10	2.05	2.15
Sheets, No. 27, Pittsburgh	2.65	2.65	2.65	3.00
Barb Wire, f.o.b. Pittsburgh	2.60	2.60	2.60	2.90
Wire Nails, f.o.b. Pittsburgh	2.00	2.00	2.00	2.05
Cut Nails, f.o.b. Pittsburgh	2.15	2.15	2.15	2.05

METALS:

Copper, New York	14.75	14.75	14.50	11.87½
Spelter, St. Louis	5.40	5.50	5.40	4.12
Lead, New York	4.37½	4.37½	4.65	4.12
Lead, St. Louis	4.22½	4.25	4.57½	4.00
Tin, New York	29.00	30.05	29.25	28.25
Antimony, Hallett, New York	7.00	7.00	7.00	8.00
Nickel, New York	40.00	40.00	40.00	50.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.99	3.99	3.99	4.19

* Foreign.

Chicago.

FISHER BUILDING, May 6, 1903.—(By Telegraph.)

In several departments of the Iron and Steel industry there has been a hesitation, if not real anxiety, resulting from the attitude of labor, which, notwithstanding May 1 has come and gone, is still such as to make employers unusually cautious in laying plans for the future. All the difficulties are not at the surface, and an upheaval would not be surprising at any day. There seems to be a disposition, however, to adjust differences, and if the more conservative element among the trade unions can hold control the entire question of hours, wages and working conditions will be adjusted satisfactorily; and when this unsettling element is eliminated there is evidence that considerable activity will follow. At the moment Structural Material, Sheet and, up to within a few days, Bars have been slow, the dragging market in these lines causing some dire predictions, but there is reason to believe that depression in these lines will be only temporary. Already, within the past few days, some fair sized contracts for Soft Steel Bars, aggregating about 20,000 tons, have been placed. The demand for Plates, too, has increased, and Rails are still in active and urgent demand, with some little improvement noted in contracts taken for Agricultural Steel. Cast Pipe has continued dull, but Wrought Pipe has been in better demand, and Boiler Tubes have been especially active. Billets, Rods and Sheet Bars have continued in active demand, with a scarcity of domestic Steel, but consumers find some encouragement through the reports of freer offerings from abroad, it being reported that lower freight rates, in conjunction with a reduction in the market price in Europe, will allow foreign Billets to be laid down in this section somewhat under the prices now prevail-

ing for domestic Steel. Some liberal sales are reported to have been made on the Eastern seaboard and also for shipment to the interior. Coke has continued plentiful and weak, lower prices having been accepted and some considerable business done.

Pig Iron.—The essential features of the market have undergone but slight changes during the week. Buyers and sellers alike are watching the market very closely, there being a feeling that we are nearing the bottom of the recent dip in prices. One new element, however, has appeared which may have an influence to cause even a further decline. This is the attitude of foreign producers, who, it is claimed, being alarmed at their recent loss of the American market have, through the aid of the transportation companies, been able to make attractive delivered prices to domestic melters. If these efforts to capture further American trade are serious and the determination of domestic furnaces to keep out foreign metal renewed, the result cannot fail to be favorable to the consumer. Conditions surrounding this phase of the market, however, are nebulous, and only the future can determine the real relative position of buyers and sellers. In the meantime melters continue to adhere to their policy of buying from hand to mouth, very few if any contracts of special magnitude being placed for the last half of the year. On the other hand, it is known that a very large tonnage must be contracted for to cover requirements of melters for the last half of the year. There is reason to believe that foundries, machine and car shops, engine builders and other large consumers of Pig will have a melt equal to if not considerably greater than was the case during the latter half of last year, and most of the business for finished material has been made on the basis of prices of Pig Iron prevalent several weeks ago. The anticipation of lower prices, however, has introduced a keener competition, foreshadowing lower prices for finished material if present anticipations for Pig Metal are realized. The small volume of local business during the week has been confined largely to Foundry grades; most of the business for Southern Iron has been on the basis of \$16.50, Birmingham, for quick shipment, but there is reason to believe that for a good sized order for the last half this price would be shaded. Yet for single car orders, spot track, \$17 has been paid. The sales have varied from single cars to several 100-ton lots, and have covered the entire range from Gray Forge to No. 1 Foundry, including Soft Iron. Further small sales of Lake Superior Charcoal have been made at \$25 to \$25.50, but Basic Iron has been dull and nominal. There has also been less inquiry for Bessemer Iron, and the little trading done has been at inside quotations. Small sales of Silvery Iron have been made at concessions of 25c. to 50c. from prices previously current. The following are the prices current, f.o.b. cars, Chicago, either for quick shipment or for the last half of the year, trading being mainly at the inside prices:

Lake Superior Charcoal.....	\$24.50 to \$25.50
Local Coke Foundry, No. 1.....	23.00 to 23.50
Local Coke Foundry, No. 2.....	21.50 to 22.00
Local Coke Foundry, No. 3.....	21.00 to 21.50
Local Scotch, No. 1.....	23.00 to 23.50
Ohio Strong Softeners, No. 1.....	23.50 to 23.80
Ohio Strong Softeners, No. 2.....	22.80 to 23.30
Southern Silvery, according to Silicon.....	22.85 to 24.85
Southern Coke, No. 1.....	21.50 to 22.00
Southern Coke, No. 2.....	20.85 to 21.35
Southern Coke, No. 3.....	20.35 to 20.85
Southern Coke, No. 1 Soft.....	21.50 to 22.00
Southern Coke, No. 2 Soft.....	20.85 to 21.35
Foundry Forge.....	19.85 to 20.35
Southern Gray Forge.....	19.35 to 19.85
Southern Mottled.....	19.35 to 19.85
Southern Charcoal Softeners, according to Silicon.....	25.85 to 27.85
Alabama and Georgia Car Wheel.....	29.35 to 30.35
Malleable Bessemer.....	21.50 to 22.00
Standard Bessemer.....	21.75 to 22.00
Jackson County and Kentucky Silvery, 6 to 8 per cent. Silicon.....	30.30 to 31.30

The Pullman order for 25,000 tons of Pig Iron, which has been hanging on the market for several weeks, was closed to-day. It is reported that ten bids were received, prices varying nearly \$3 per ton. The order went to a Northern furnace, it is claimed, at \$19.50 for No. 2 and \$19 for No. 3 Foundry, delivered for shipment during June, July, August and September. This is somewhat sensational, but competition of the keenest kind. Among the tenders of Pig Iron to the Pullman Company were eight offers from Southern furnaces, several of which were within 50c. per ton of the lowest offer made by Northern furnaces, all delivered Pullman Works. It is significant that for two weeks local agents have been receiving almost daily cancellations of orders placed at high prices, upon which shipments have not been made according to contract. Sales were also made to-day, in the usual way, of 200 tons of Southern Foundry by analysis supposed to be equivalent to No. 2 by the buyer on the basis of \$16, Birmingham, or \$20.35, Chicago, for immediate shipment.

Bars.—For Iron Bars there has been very little business offered, contracts being confined mainly to single cars, but one lot of 300 tons has been placed. Notwithstanding the dullness the market has shown a slightly firmer feeling, little business being done under 1.85c., base, Chicago. Steel Bars have been decidedly more active during the past few

days, contracts aggregating about 20,000 tons having been placed by railroads, carriage men and agricultural implement manufacturers. About two-thirds of the business is for delivery during the current year, the other one-third extending up to June, 1904. Prior to the placing of these contracts the market was extremely dull. The following are the prices current, f.o.b. cars, Chicago, mill shipment: Bar Iron, 1.85c. to 1.90c.; Soft Steel Bars, 1.76½c. to 1.86½c.; Hoops, 2.16½c. to 2.26½c.; Angles, under 3 inches, 1.86½c. to 1.91½c., base. The demand for shipment from local stock has been light, but the market has remained steady as previously quoted, as follows: Bar Iron, 2.15c.; Soft Steel Bars, 2c. to 2.25c.; Angles, 2.25c., and Hoops, 2.40c., base, from store.

Structural Material.—The large contracts referred to several weeks since, including 18,000 tons for the Wanamaker Building at Philadelphia, 15,000 tons for the Wanamaker Building at New York, 4500 tons for the First National Bank building at Cincinnati and 4500 tons for the Merchants' Exchange Building at San Francisco, have been consummated during the week, but, aside from these contracts, which cannot be considered new business, the market has been extremely dull, especially for shipment from mill. Shipments of Small Angles can now be obtained very promptly, but large sizes still require from 60 to 90 days. The reverse is true of Beams and Channels, however, the larger sizes being more readily available. The uncertainty of labor actions is reflected more in this line than in most others. The tone of the market continues firm, and prices remain unchanged as follows for mill shipment: Beams, Channels and Zees, 15 inches and under, 1.75c. to 1.90c.; 18 inches and over, 1.85c. to 2c.; Angles, 1.75c. to 1.90c. rates; Tees, 1.80c. to 1.90c.; Universal Plates, 2c. to 2.25c. The demand for quick shipment from local stocks has been readily met, and the market has continued steady as follows: Beams and Channels, 2¼c. to 2½c.; Angles, 2.25c. to 2.50c.; Tees, 2.30c. to 2.55c., at local yards.

Plates.—There has been some improvement in the demand for Plates, with sales of about 11,000 tons for delivery during August and September. Where it is possible for independent mills to make shipments before August 1 premiums are still obtained over official prices. The following are the prices current, f.o.b. cars, Chicago, mill shipment: Tank Steel, ¼-inch and heavier, 1.75c. to 2c.; Flange, 1.85c. to 2.15c.; Marine, 1.95c. to 2.10c. There has been a fair movement from local stocks, and the market has remained firm at full prices: Steel, ¼-inch and heavier, 2.15c. to 2.20c.; Tank Steel, 3-16 inch, 2.25c. to 2.30c.; No. 8, 2.30c. to 2.40c.; Flange Steel, 2.40c. to 2.50c., all f.o.b. warehouse, Chicago.

Sheets.—The market for Sheets has been quiet with freer offerings, and for stock sizes prompt shipments can be made from mill, but where special sizes are required from two to three months are required before delivery can be made because of the scarcity of Sheet Bars. Sales direct from manufacturers continue to be made on the basis of 2.75c., Pittsburgh, or 2.91½c., Chicago, for No. 28. The following are the prices asked by second hands for Black Sheets, carload lots, Chicago, mill shipment: No. 10, 2.12½c. to 2.16½c.; No. 12, 2.22½c. to 2.26½c.; No. 14, 2.32½c. to 2.36½c.; No. 16, 2.42½c. to 2.46½c.; Nos. 18 and 20, 2.56½c. to 2.60½c.; Nos. 22 and 24, 2.66½c. to 2.70½c.; No. 26, 2.76½c. to 2.80½c.; No. 27, 2.86½c. to 2.90½c.; No. 28, 2.96½c. to 3.00½c. Small lots at from 10c. to 20c. above mill prices. Galvanized Sheets are selling slowly, and although there is no change in quotations it is reported that concessions are being made in some instances. For mill shipment prices continue 75 and 10 discount, Pittsburgh, and at 75 and 5 discount, Chicago. For shipment from local stocks 75 and 2½ to 75 discount is asked.

Cast Pipe.—There has been but little if any improvement in the demand from gas and water companies, railroads or mining companies, most of the business being in small lots. Sales, however, have been made of 45,000 tons of 6's to 30's for delivery at Minneapolis, it being understood that the committee have reported favorably on the placing of this contract; about 18,000 feet or 4500 tons of 3-4's are required at Kansas City, and 6000 tons of 20's were purchased by the Indianapolis Gas Company. Manufacturers continue to sell at the following prices, f.o.b. cars, Chicago, the outside quotations being for small lots: Four-inch, \$33 to \$34; 6-inch, \$32 to \$33; 8-inch, \$31.50 to \$32, and larger, \$31 to \$31.50, for Water, and \$1 per ton higher for Gas Pipe.

Billets.—The urgent demand for Billets previously noted has continued during the week, with sales of 1500 tons of domestic Bessemer Billets at \$30.50, Youngstown, for June and July delivery, and 10,000 tons ditto at \$30, Youngstown, for delivery during the last half of the year. Sales are also pending on 3000 tons at \$30, Youngstown, or \$32.60, Chicago, for delivery during the next three months. It is reported that lower prices are being made on foreign Steel for delivery in the Central West on lower through freight rates, but local importers report it impossible to obtain supplies earlier than August shipment, with the foreign producers asking \$1 a ton above last sales. Under the circum-

stances prices in this market for the moment are nominal. Open Hearth Steel Billets are scarce, sales being confined to jobbing lots and prices ranging from \$34 to \$38, according to analysis, buyer and time of delivery. Sales of 500 tons of Rods are reported at \$40 for May and June shipment.

Merchant Pipe.—There has been a fair tonnage of new orders placed for Merchant Pipe, with the mills still well sold ahead. It is reported that independent producers are unable to make deliveries from 60 to 90 days on assorted sizes. The largest interest are making shipments of straight cars of one size promptly, but for assorted sizes from three to six weeks are required. The market remains firm in tone, the following being the official schedule of discounts for carload lots, Chicago, base, random lengths, mill shipment:

	Steel Pipe.		Guaranteed Wrought Iron.	
	Black.	Galvd.	Black.	Galvd.
Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
1/8 to 3/4 inch.....	66.35	56.35	63.35	53.35
1/2 inch.....	68.35	58.35	65.35	55.35
3/4 to 6 inches.....	73.35	63.35	70.35	60.35
6 to 12 inches.....	67.35	57.35	64.35	54.35

Less than carloads, 12 1/2 per cent. advance.

Boiler Tubes.—An active demand has been experienced, sales being quite heavy for direct shipment from the mills, and the market has remained firm in tone, the following schedule of discounts for carload lots, Chicago, being current:

	Steel.	Iron.
1 to 1 1/2 inches.....	43.35	38.35
1 1/2 to 2 1/2 inches.....	55.85	35.85
2 1/2 to 5 inches.....	60.85	45.85
6 inches and larger.....	55.85	35.85

Less than carloads, 12 1/2 per cent. advance.

Local jobbers have continued to attract a fair volume of orders, and the market has remained steady. The following are the discounts for shipments from local stocks:

	Steel.	Iron.
1 to 1 1/2 inches.....	40	35
1 1/2 to 2 1/2 inches.....	50	32 1/2
2 1/2 to 5 inches.....	57 1/2	42 1/2
6 inches and larger.....	50	..

Merchant Steel.—No specially large business has been closed for Agricultural Steel during the week, but the aggregate tonnage has been of fair proportions, including contracts covering the entire season. While fewer Implement manufacturers have entered the market thus far this year, the tonnage placed by those who have covered has been equal to, and in some instances larger, than that called for in the orders placed a year ago. There has been a fair demand for Crucible Steel, and the market has remained steady. Better demand has been experienced for Shafting, and the market has also remained steady. The following are the prices current at Chicago for mill shipment: Smooth Finished Machinery Steel, 2.01 1/2c. to 2.11 1/2c.; Smooth Finished Tire, 1.96 1/2c. to 2.11 1/2c.; Open Hearth Spring Steel, 2.66 1/2c. to 2.76 1/2c.; Toe Calk, 2.31 1/2c. to 2.46 1/2c.; Sleigh Shoe, 1.86 1/2c. to 1.96 1/2c.; Cutter Shoe, 2.41 1/2c. to 2.61 1/2c. Ordinary grades of Crucible Tool Steel are quoted at 6 1/2c. to 8c. for mill shipment; Specials, 12c. upward. Cold Rolled Shafting in carload lots sells at 47 and in less than carload lots at 42 discount from list.

Rails and Track Supplies.—The urgency of demand for both Standard and Light Sections has continued, and railroads which some time since refused to accept deliveries in October have placed orders for November and December delivery. Western mills are sold for the entire year on Standard Sections, most of the business offering being taken by Eastern mills, the sales during the week being about 10,000 tons. During the month of April sales of Light Sections by Western mills aggregated about 11,000 tons, while the current output of the mills has been a little over 6000 tons. Considerable business has been done in resales, or rather for second hands, and the market has continued strong at full prices; official quotations remaining \$28 for Standard and \$27 for second quality, mill shipment, while Light Rails sell at \$35 to \$40, according to weight. Track Supplies have continued active, Spikes especially being sold well ahead. The difficulty of making deliveries has caused the turning down of large orders for continuous Rail Joints. The following are the prices current at Chicago for mill shipment: Splice or Angle Bars, 2c. to 2.25c.; Spikes, 2.10c. to 2.25c.; Track Bolts, 3 1/2 to 3 3/4 inches and larger, with Square Nuts, 2.85c. to 3c.; with Hexagon Nuts, 3c. to 3.25c. From store, 10c. to 15c. over mill prices are asked and obtained.

Old Material.—While the offerings have not increased materially, the closing down of several of the mills has lessened the demand, and the market has reflected this change by an easier feeling, with lower prices prevailing for Machine Shop Turnings and Borings and No. 2 Railroad Wrought. On the other hand, Old Steel Rails are scarce and wanted, especially long lengths, for which higher prices have been obtained. The following are the prices per gross ton, Chicago:

Old Iron Rails.....	\$24.50 to \$24.75
Old Steel Rails, mixed lengths.....	18.50 to 19.00
Old Steel Rails, long lengths.....	22.25 to 22.75
Heavy Relaying Rails.....	31.50 to 32.00
Old Car Wheels.....	24.00 to 24.50

Heavy Melting Steel Scrap.....	to 18.50
Mixed Steel.....	16.00 to 16.50

The following quotations are per net ton:

Iron Fish Plates.....	\$21.50 to \$22.00
Iron Car Axles.....	24.50 to 25.00
Steel Car Axles.....	23.50 to 24.00
No. 1 Railroad Wrought.....	20.00 to 20.50
No. 2 Railroad Wrought.....	18.00 to 18.25
Shafting.....	20.00 to 21.00
No. 1 Dealers' Forge.....	16.50 to 17.00
No. 1 Bushing and Wrought Pipe.....	14.00 to 14.50
Iron Axle Turnings.....	14.50 to 15.00
Soft Steel Axle Turnings.....	14.25 to 14.50
Machine Shop Turnings.....	14.25 to 14.50
Cast Borings.....	9.00 to 9.50
Mixed Borings, &c.....	10.50 to 11.50
No. 1 Boilers, cut.....	14.50 to 15.00
Heavy Cast Scrap.....	17.50 to 17.75
Stove Plate and Light Cast Scrap.....	13.50 to 13.75
Railroad Malleable.....	16.50 to 17.00
Agricultural Malleable.....	15.50 to 16.00

Metals.—Copper has improved in tone, the market being relieved by the disposition of the resale lots which have been pressing, and although the demand is not active, there has been some little improvement. Sales of Lake have been made in this market mainly at 14 1/2c. in carload lots and 14 1/2c. to 15c. in a jobbing way. Pig Lead has been quiet but unchanged, with prices nominal in this market on the basis of 4.30c. in 50 to 100 ton lots and 4.32 1/2c. to 4.35c. in carload lots. A firmer tone has prevailed for Spelter with a fair demand, sales being made on the basis of 5.45c. in carload lots for Slabs. Sheet Zinc is still strong, with a good demand at 6 1/4c., Chicago. Old Metals have been a little firmer in tone with the improved demand. The market has remained firm. Heavy Cut Copper is selling at 12 1/2c., Red Brass at 12 1/2c., Copper Bottoms at 11 1/4c., Lead Pipe at 4.35c. and Zinc at 4.25c., spot.

Coke.—The ovens have made freer offerings, which have led to some increase in business at lower prices, sales of Furnace Coke having been made at \$3.50 to \$4 and Foundry Coke at \$4.50 to \$5 at the ovens, freight to Chicago being \$2.65. Spot supplies have sold at \$6 to \$7.50 per ton, on track, according to quality and conditions.

The Field-Evans Iron Company have taken offices at 1029 and 1030 Monadnock Building, Chicago, David Evans, president, having removed from room 1525 to the above location. Wood & Co., railway equipment, and A. E. Rosenthal, Iron and Steel, Chicago, have moved from room 740 to offices at 545 and 546 Marquette Building.

The meeting of the Cook County Founders' Association, which was to have been held Tuesday night, has been postponed until Thursday, May 7. Officers will be elected for the ensuing year at that time.

The report that the Emlyn Iron Works, at East Chicago, have been closed down is an error. The puddling department was closed temporarily for two days, but the finishing mills have been, and are, in operation. Trouble with some of the unskilled labor was the cause of temporary suspension in the puddling department.

Philadelphia.

FORREST BUILDING, May 5, 1903.

The situation in the Iron trade appears to be as complicated as ever, and opinions as to the immediate outcome are extremely mixed. The idea of a lower range of prices is so general as to be almost universal, although plausible suggestions to the contrary are not wanting by any means. One leading interest in a circular letter to the trade intimate that the absence of demand now will precipitate such a rush of business toward midsummer that last year's experience may be again repeated. This, of course, is possible; but those of a contrary opinion base their ideas on the fact that conditions at the present time are in many respects almost the reverse of what they were a year ago. There is, for instance, good prospect for an abundance of Coal and Coke, and there are ample transportation facilities, consequently there is not likely to be any such restriction in the output as there was during last summer. The supply of Pig Iron is therefore likely to be considerably larger than last year, and in addition to that foreign markets are ready to give us a large tonnage if prices remain at about to-day's figures. There are two sides to the question, of course, and while it is impossible for any one to say with absolute certainty what the outcome will be, the majority of buyers seem to be willing to take their chances until there are stronger reasons for changing their position than now appear. Finished Material is not as active or as firm as it ought to be considering the season of the year. The volume of business is large, probably as large as it ever was, but the additions to the productive capacity have been so general, and in many cases so important, that a steadily increasing business is necessary to keep the mills evenly fairly well employed. That the outlook in this respect is not encouraging is shown by the easier prices which prevail in nearly all descriptions of Finished Material.

Pig Iron.—Very peculiar conditions prevail in this

branch of the Iron trade. Steel making materials are scarce and strong, with a fair prospect of continuing so indefinitely, but Foundry grades are dull, weak and neglected. Under such conditions it is difficult to predicate the course of the market with much confidence, although it is felt that the trend of prices will be downward, but to what extent, and how soon it will develop, it is impossible to say. Sellers are naturally disposed to put the best face possible on the outlook, but there is so little evidence of strength, and so many evidences that top figures have been reached, that it is impossible to resist the impression that a lower range of prices will be necessary to stimulate new buying. The claim that the longer buyers hold off the more danger there is that they will overstay the market is not well founded, because the same conditions apply to makers as well as to consumers. It makes very little difference whether three months' supplies are bought in one week, or whether the purchases are made week by week for the three months; the important point is to determine whether more Iron will be made than will be consumed during that period. Experience has shown that when there is a general conviction that the top limit of prices has been reached purchases are restricted, and what in the first place was an impressor ultimately becomes a settled fact. This is simply a reversal of conditions that are met with on a rising market, and is due to what is frequently defined as "feeling it in the bones." The feeling at the present time is not that business is in bad condition, or that it is likely to be so, but there is a distinct impression that prices of Pig Iron are too high, and so far as buyers are concerned they are determined not to load up with it unless there is something different in the outlook than appears at the present time. As a rule, sellers show considerable firmness, and as bids are not forthcoming for large lots, they insist on full figures for small lots, which must be purchased, be the price what it may. Nevertheless, there are some indications that large producers are getting tired of this kind of business, and it should cause no surprise if some of them in the near future announce a new list of prices. It is regarded as unbusinesslike to be subject to what is called "meeting the market," and a good deal of that has been done during the past two or three weeks, and so that in some quarters the question of a distinct reduction is under serious consideration. Quotations are nominally unchanged, but it is more or less a "go as you please market," so that the prices named herewith depend a good deal on the circumstances in each particular case. A fair average of the market would be about as follows for Philadelphia or nearby points, deliveries to July, later dates fractionally lower:

No. 1 X Foundry.....	\$22.50 to \$23.00
No. 2 X Foundry.....	21.00 to 21.50
No. 2 Plain.....	20.50 to 20.75
Gray Forge.....	19.00 to 20.00
Basic.....	19.75 to 20.25
Middlesbrough, No. 3.....	20.50 to 21.00
Scotch.....	22.00 to 23.50

Cargo lots, c.i.f.:

Low Phosphorus, 0.035.....	\$21.25 to \$21.50
Bessemer.....	20.25 to 20.50
Middlesbrough, No. 3.....	17.50 to 18.00

Steel.—There is a heavy demand for Steel, and Basic Open Hearth is taken at about \$32, delivered buyers' mills. Large lots of foreign Steel have been placed mostly for interior points, cost said to be around \$29.50, delivered in consumers' yards. It is supposed that special rates of freight were secured, otherwise the deals could not have been put through.

Plates.—Prices are not strong when large orders can be had, but on the general run of business quotations are unchanged. Consumption is heavy, but the output at mills is very much larger than at any former period, so that it requires a good deal of hustling to secure full employment. Lower figures than at any period within 12 months have been accepted during the past week, and 1.80c. to 1.85c. are ordinary quotations on lots of not less than several hundred tons each, the range being about as follows for deliveries at nearby points: Small lots, 1.95c. to 2c.; carload lots, ¼-inch and thicker, 1.80c. to 1.85c.; Universals, 1.85c.; Flange, 2c.; Marine, 2.10c. to 2.15c.; Fire Box, 2.20c. to 2.25c.

Structural Material.—Business is rather light, but work on back orders keeps the mills well employed, so that a little temporary inactivity is of no great importance, as there appears to be plenty of business ahead. Prices are unchanged and deliveries are fairly up to buyers' requirements. Sales mostly at about the following figures: Beams, Angles or Channels, ordinary sizes, 1.73½c. to 1.78½c.; carload lots as a minimum, with the usual addition for smaller quantities.

Bars.—The Bar Iron situation is rather disquieting, as the available business is not sufficient to go around, and as Steel Bars are from \$2 to \$4 per ton below Iron, it is difficult to adjust matters satisfactorily. An adjourned meeting of the Eastern Bar Iron Association is to be held in New York on Wednesday, when it is expected that some plan will be adopted to relieve the recent unsatisfactory con-

ditions. Meanwhile we repeat last week's quotations—viz.: Best Refined Iron Bars, 1.93½c. for carload lots as a minimum quantity, and 1.75c. to 1.80c. for Steel Bars.

Sheets.—The demand is heavy, and prices are fairly maintained, although in proportion with raw material, they are too low. The demand runs mostly on thick Sheets, thin Sheets being somewhat less active, at about 3c. for No. 28.

Old Material.—It is an extremely difficult market to do business in. Steel Scrap commands pretty full prices, but Iron is difficult to move at quoted rates. Bids and offers are as follows for deliveries in buyers' yards:

Old Steel Rails.....	\$21.50 to \$22.00
Heavy Steel Scrap.....	20.75 to 21.50
Low Phosphorus Scrap.....	28.00 to 29.00
Old Steel Axles.....	26.00 to 27.00
Old Iron Rails.....	24.50 to 25.00
Old Iron Axles.....	29.00 to 30.00
Old Car Wheels.....	24.00 to 25.00
Choice Scrap, R. R. No. 1 Wrought.....	23.00 to 23.50
Country Scrap.....	19.50 to 20.50
Machinery Scrap.....	19.50 to 20.50
No. 2 Light Scrap.....	18.00 to 19.00
No. 2 Light (Ordinary).....	14.00 to 15.00
Wrought Turnings.....	16.50 to 17.00
Wrought Turnings, Choice Heavy.....	17.50 to 18.00
Cast Borings.....	11.25 to 11.75
Stove Plate.....	15.00 to 16.00

Chas. A. Barnes, who recently completed his tenth year with the house of Frank Samuel, has accepted a position as general manager of the Philadelphia office of Chas. Dreifus & Co. in the North American Building, Broad, below Chestnut street.

Cleveland.

CLEVELAND, OHIO, May 5, 1903.

Iron Ore.—The lake freight market in Ore has been quiet for the past week. There were constantly more boats at the loading ports than were needed, and at the same time the shipment from the upper lakes congested the Lake Erie docks with tonnage, because the Ore dock machinery on the lower lakes is not yet working freely. The present week ought to develop the policies of both shippers and vessel owners for the year because the Ore movement will be freer and because all of the boats which have been held in winter quarters until now will be in service. The reports for April show that 750,000 tons were moved from the Lake Superior docks to the docks on Lake Erie, to which must be added the shipments from Escanaba, which began much earlier than Duluth, and the total result will approximate 1,000,000 tons for the season to May 1. This is about 750,000 tons short of the shipment in the same period a year ago. The late opening and the strike of the marine firemen did not have such a sweeping effect after all. The wild rates and the season contract rates are identical. They are 85c. from Duluth to Lake Erie, 75c. from Marquette and 65c. from Escanaba.

Pig Iron.—There is very little change in the condition of the Pig Iron market, especially in the Foundry grades. The past week brought out no orders past July 1, and the inquiries have seemingly stopped for the time being. The producers are not much concerned, having faith in the future of the market. There has been a great deal of talk of a possible reduction in prices, and this perhaps accounts for the period of quietness. First half sales have been limited to the capacity of the few outside furnaces which are making any effort to meet current demands. Prices have not changed, being \$21 to \$21.50, Valley furnace for No. 2 for second half. There have been a great many reports about as to sales of Bessemer for the last half of the year. The Bessemer Association has not participated in these transactions, and the big consumers have given no indication lately that they have any desire to make extensive purchases. The furnacemen are not showing the apprehension which might be expected of them, but are satisfied that the contracts will be closed, although it may not be until late in this month, or even well along in June. There has been no activity for May and June, because no Iron is available. Basic has been practically off the market for both first and second half delivery. The prices, which are nominal, are \$21.50 to \$22, Valley furnace, for first half and \$20 for second half. The supply of Coke has been better of late, and prices have eased somewhat. Deliveries have been prompt and satisfactory, and production has been generally about normal.

Finished Iron and Steel.—With the possible exception of the Bar and Structural trades the market shows a solid front of activity that speaks well for the latter part of the year. The Bar market shows a hesitancy rather a weakness. It seems as if consumers are waiting for some developments. The Agricultural Implement works want to know more about possible crops before buying very heavily. The question of price seems to have been regulated to a secondary place. The Bar Iron situation does not change materially. The demand is as heavy as the supply will permit, but the mills are making no effort to induce business. Prices have not changed, being 1.60c., Pittsburgh, for Besse-

mer Steel; 1.70c., Pittsburgh, for Open Hearth Steel; 1.80c. to 1.85c., Youngstown, for Bar Iron. Choice orders only are taken at 1.80c. The Structural trade is easy and inclined to be weak, and the only explanation is that possibilities of labor difficulties have had a depressing effect. The mills of the Pittsburgh district find that on certain sizes, principally 12-inch and over, and 3-inch and under, they can make almost immediate delivery. Other sizes will take more time for shipment. The demand for spot delivery is not strong enough to warrant any of the consumers paying premiums. The jobbers are able to take care of all of this business. Prices hold at 1.60c., Pittsburgh, from all mills, and 2.15c. to 2.25c. out of stock. Plates have been strong and the market is firm. The smaller mills are getting a good premium. Prices are 1.60c., Pittsburgh, from the larger mills and 2c., Cleveland, from the smaller concerns. The specification on old contracts has been heavy. The Sheet trade is strong and the buying has been active. The producers and the dealers are a little timid about the latter part of the year, and there will be conservatism as to price advances on that account. The mills are fairly well filled with orders and at times deliveries are slow. Business in this territory is confined in a large measure to stock sales. The prices are based on 3.10c. to 3.25c. for No. 27 Black Sheets out of stock and 2.85c. to 2.95c. for the same grade from the mills. The Rail trade has been interesting because the demand from new steam railroad projects and new electric line ventures has been very promising and a good tonnage might have been placed had the mills been in position to make desired deliveries. The books are, however, crowded with orders. There is a good demand for Light Rails. Prices have not changed from \$28 for Standard and \$36, Pittsburgh, for Light Rails. The call for semifinished material, Billets, Blooms, Muck Bars and the like, has been strong and active with the supply quite limited and the big mills making no quotations.

Old Material.—The demand for Steel Scrap is still very much in excess of the possible supply, and a good many of the dealers are sold short. There is a big call for Cast Scrap, but this material is a little more plentiful. In the general run of Old Material there has been an easing up due to the better supply. Prices are as follows: No. 1 Wrought, \$19.50, net; Cast Borings, \$12, gross; Car Wheels, \$22.50, gross; Heavy Steel, \$21, gross; Iron Rails, \$25.50, gross; Iron Axles, \$27.50, net; Wrought Turnings, \$14.50, net; Old Steel Rails, \$21, gross.

The Republic Iron & Steel Company have decided to market their Pioneer Pig Iron themselves. It has been sold hitherto through M. A. Hanna & Co. of Cleveland.

Cincinnati.

FIFTH AND MAIN STS., May 6, 1903.—(By Telegraph.)

The situation in the Pig Iron market at this date is certainly an extremely interesting one, and while there is no very material change as far as the buyers are participating in the market, yet there is a growing feeling of unrest on the part of some sellers; this has emphasized itself during the week by a further cut of 50c. in the price of Southern Iron, the reduction being made by furnaces outside of the association. So far as can be learned the associated furnaces are holding quietly to their agreed basis of \$17.50 for No. 2, Birmingham, and their representatives are putting up some pretty strong arguments in favor of a "bull" market, at least against anything in the shape of a serious decline. Investigation shows that but few buyers have covered their wants for the last half of the year, and many of these are known to have loaded themselves up with contracts which call for larger quantities of raw material. What Iron there is being sold is almost invariably small lots for prompt shipment, and the larger contracts, an occasional one of which reaches 1000 tons, are mainly for May and June delivery. Some furnaces are piling up a little Iron in the South, and this accumulation is being made the most of as an argument by those who are seeking to depress prices still further. Statisticians and people who draw their arguments from that view of the situation, while admitting that it may be impossible to check the present decline just where it is, yet claim that the situation is so inherently strong as to absolutely bar the idea of anything like a serious slump in prices. It is now as it ever has been in the past, that the law of supply and demand will be the arbitrator after the present period of unrest has terminated and for the present there is nothing to do but quietly await the passage of the next few weeks. Some authorities who are considered conservative believe that on the present minimum basis the market is not a bad one for buyers to tackle, and they are so advising their friends. The action of the associated furnaces in the event of business being started on this minimum basis is something that the field would like to be certain of. An inquiry in one of the lake cities for 1200 or 1500 tons of Iron has brought out almost every seller, and it is reported that some very low

prices have been offered; the bid was not to be awarded until to-day, consequently the people at large are not posted on the actual selling price. Freight rates from the Hanging Rock district, \$1.15, and from Birmingham to Ohio River points \$3.25. We quote, f.o.b. Cincinnati, for delivery throughout the year, as follows:

Southern Coke, No. 1.....	\$19.75 to \$21.25
Southern Coke, No. 2.....	19.25 to 20.75
Southern Coke, No. 3.....	18.75 to 20.25
Southern Coke, No. 4.....	17.75 to 19.75
Southern Coke, No. 1 Soft.....	19.75 to 21.25
Southern Coke, No. 2 Soft.....	19.25 to 20.75
Southern Coke, Gray Forge.....	17.00 to 19.50
Southern Coke, Mottled.....	17.00 to 19.50
Ohio Silvery, No. 1.....	26.15 to 27.15
Lake Superior Coke, No. 1.....	22.15 to 23.15
Lake Superior Coke, No. 2.....	21.15 to 22.15
Lake Superior Coke, No. 3.....	20.15 to 21.15

Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$28.25 to \$29.25
Lake Superior Car Wheel and Malleable.....	27.50 to 28.50

Plates and Bars.—We quote, f.o.b. Cincinnati, as follows: Iron Bars in carload lots, 1.92c., with half extras; same, in small lots, 2.20c., with full extras; Steel Bars, carload lots, 1.73c., with half extras; same, in small lots, 2.20c., with full extras; Plates, 1/4-inch, in carload lots, are still nominally 1.70c.; 3-16 inch, 1.80c.; Beams and Channels, 1.70c., base.

St. Louis.

CHEMICAL BUILDING, May 6, 1903.—(By Telegraph.)

Pig Iron.—Buyers are still scarce in the Pig Iron market, and the little trade that is coming up is in small lots for immediate shipment. There seems little doubt but that it is the intention of the traders to negotiate for large supplies, but the uncertainty in the movement of prices is the strongest argument against an extensive buying movement at this time. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry.....	\$20.75 to \$21.75
Southern, No. 2 Foundry.....	20.25 to 21.25
Southern, No. 3 Foundry.....	19.75 to 20.75
Southern, No. 4 Foundry.....	19.25 to 20.25
No. 1 Soft.....	20.75 to 21.75
No. 2 Soft.....	20.25 to 21.25
Gray Forge.....	18.75 to 19.75
Southern Car Wheel.....	28.50 to 29.75
Malleable Bessemer.....	25.00 to 25.75
Ohio Silvery, 8 per cent. Silicon.....	32.50 to 33.00
Ohio Strong Softeners, No. 1.....	to
Ohio Strong Softeners, No. 2.....	to

Bars.—The movement in Iron and Steel Bars through the jobbing trade is said to continue in very fair volume. We quote from the mills: Iron Bars at 1.85c. to 1.90c.; Steel Bars at 1.82 1/2c. to 1.90c., half extras. Jobbers continue to quote 2.15c. in round lots and 10c. higher for small quantities for both Iron and Steel.

Rails and Track Supplies.—General conditions in the market for Rails and Track Supplies are unchanged. Notwithstanding the policy of concentration of the great systems of railroads which has worked against large extensions in a great deal of territory, mileage under contract and now in process of construction does show an increase over the total of last year. Figures are said to show that the South and Southwest territory is credited with the largest percentage of improvement and new development. Prices quotable as follows: Splice Bars at 2.05c. to 2.25c.; Bolts, with Hexagon Nuts, 3.05c. to 3.25c.; with Square Nuts, 2.90c. to 3.05c.; Spikes, 2.25c. to 2.30c. Jobbers' prices are generally about 10c. to 15c. higher than the above quotations.

Angles and Channels.—The jobbing trade continues to report steadiness in the demand for Small Angles and Channels. Conditions are said to be generally satisfactory all around. For material of this class in lots from store 2.25c. to 2.40c. prevails.

Pig Lead.—Lead conditions are said to be generally steady, with the volume of transactions of a moderate description. Prices for Missouri grades at this time are quotable at 4.22 1/2c. to 4.25c.

Spelter.—The position of the Spelter market continues to be a strong one, and it is said that reserve stocks of the metal are too low to warrant a lower range of prices. There seems to be a goodly number ready and anxious to take advantage of any lower range of quotations, and under these conditions and influences the market preserves a very strong tone. For immediate shipment quotable at 5.50c., with 5.40c. to 5.45c. for futures.

William Strang, assistant superintendent of the Carnegie Steel Company's steel plant at Braddock, Pa., and for the past 17 years in charge of the Edgar Thomson furnaces, died suddenly on April 21 at his home in Braddock, aged 46 years.

George W. Barr, one of the founders of the Crescent Steel Company under the firm name of Miller, Barr & Parkin, died April 21 at his home in Philadelphia. Mr. Barr retired from business some years ago.

Pittsburgh.

(By Telegraph.)

PARK BUILDING, May 6, 1903.

Pig Iron.—The market on Pig Iron is in a very unsettled condition, and only a limited tonnage is being sold. There are some weak spots in the situation due largely to the fact that two or three new blast furnaces are about ready to start. These furnaces are actively seeking contracts for Iron and are naming comparatively low prices to secure business. The railroads are making prompt delivery of Coke, and with Pig Iron again in a normal condition the result has been that prices have eased off to some extent, with a probability that lower figures will be reached before the market settles. In the meantime buyers are going slow, awaiting such time as the market may settle and warrant them in purchasing Iron. Premiums for prompt delivery of Pig Iron have entirely disappeared, a number of furnaces being able to ship out promptly. Bessemer Iron is moving only in small lots, which are held at \$19.25 to \$19.40 at Valley furnace. It is probable that for a large tonnage of Bessemer Iron for shipment over six months, \$19, at furnace, would be done. It is intimated that the United States Steel Corporation would buy Iron on the basis of about \$19, at furnace, but this has not been verified. Forge Iron is extremely quiet and Northern brands are being offered at \$20 to \$20.25, f.o.b. Pittsburgh, but there is practically nothing doing. Foundry Iron is also quiet and a number of contracts placed some time ago at higher prices than are now ruling have either been canceled or else buyers are not taking in the Iron. Official prices on Southern Forge and Foundry Iron are being shaded to some extent. Under these prices Southern Gray Forge is \$19.85, Pittsburgh, but this has been shaded 25c. a ton and perhaps more. Southern No. 2 Foundry, the official price of which is \$21.35, Pittsburgh, has also been sold at lower figures. It is probable that the Pig Iron market will remain comparatively dull until prices have settled to a point that will induce buyers to come in and place contracts.

Steel.—We can report a very strong market in Steel, but buying in the past week has been light. The Steel mills are full of work and are not in need of specifications, and this has held up prices. Bessemer Billets range from \$31 to \$31.50, and Open Hearth Billets \$31.50 to \$32, f.o.b. Pittsburgh. A good deal of tonnage in Bessemer Billets and Slabs has been sold in the past two weeks to Sheet and Tin Plate mills at prices ranging from \$30.50 to \$31, at mills located outside the Pittsburgh district.

Old Material.—The market on Scrap continues active and prices are relatively firm. Heavy Melting Stock is held at about \$21.50 to \$22, Pittsburgh. We note a sale of 1500 tons at the lower price.

(By Mail.)

There is a little more feeling of uncertainty in some quarters, but the market is holding up well nevertheless. Pig Iron sales have been confined almost entirely to Bessemer, where the bottom seems to have been about reached, while there are indications of the Foundry Iron market working around to a little lower level. Pig Iron, Steel and Finished lines are well sold up for several months ahead and the market can well stand a lull. The high pressure seems to be over, premiums for early delivery having disappeared in most lines. Furnaces which contracted for more Coke than they needed during the freight congestion now have an excess, which in some cases is being put on the market. Pig Iron for prompt shipment generally does not command a premium. Premiums on prompt Plates are less than a month or two ago, although the mills are well filled up on large contracts for several months. Fabricators of Structural Material are receiving good orders, and now that their labor troubles are about over are turning in specifications freely to mills on their contracts. Common Iron Bars are offered at slightly lower figures. The movement in Pipes and Tubes is fully equal to current production and is regarded as entirely satisfactory. No change has been made in official prices of Sheets and Tin Plate. Independent mills are doing base prices for their regular customers on desirable contracts for Sheets, but are asking good premiums for scattered inquiries. Tin Plate, both Bright and Roofing, is very scarce, and premiums are the invariable rule. The new list on Eave Trough and Conductor Pipe, for central territory, advances prices to dealers, less than carloads, from 75 to 70 and 7½ on nested Pipe, from 70 and 10 to 70 on Pipe not nested, and from 80 to 75 and 12½ for Eave Trough, or net advances of 11 1-9 per cent. on Pipe and 9½ per cent. on Eave Trough, large jobbers being given their regular discounts in additions.

Structural Material.—Specifications are coming in satisfactorily from bridge and building companies on regular contracts, and while mills are full of work there is dissatisfaction with deliveries. We quote: Beams and Channels up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars,

1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c. to 1.70c.

Plates.—There is a fair tonnage of new business going and satisfactory specifying against old contracts. Mills are filled with work, but are able to take care of customers at base prices. Premiums, which were heavy last year and increasing, are now being charged only on small lots for early shipment. Official prices are as follows: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches wide, 5c. extra per 100 lbs. Plates 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Spelter.—Prices are higher, but the market is quiet, and we quote prime Western grades at 4.58½c. for future and 5.63½c. for prompt, delivered, Pittsburgh.

Iron and Steel Bars.—There is very little buying ahead in Steel Bars, but fairly good specifying on running contracts. Mills are making good deliveries, and could take on more tonnage without difficulty. Iron Bars are well sold up to July 1. There is more shading in Western territory than formerly, but practically none in the Pittsburgh district, sales being made locally at 1.89½c., delivered, small lots bringing 1.95c., half extras, as per National card. We quote Steel Bars at 1.60c., at mill. All specifications for less than 2000 lbs. of a size subject to the following differential extras: Quantities less than 2000 lbs., but not less than 1000 lbs., 0.10c. per lb. extra. Quantities less than 1000 lbs., 0.30c. per lb. extra, the total weight of a size to determine the extra regardless of length.

Steel Rails.—On standard steam Rails mills are booked practically to the close of the year, but on trolley Rails and light Rails there is some open capacity. Mills have been in receipt of several requests to open their books for 1904 delivery, but so far have refused. We quote at \$28, at mill, for Standard Sections, in 500-ton lots and over.

Muck Bar.—There is hardly anything doing in the market, mills being filled up for a couple of months and inquiry being light. We quote best grades of local Muck Bar at \$35, Pittsburgh.

Spikes.—The demand for Spikes is very satisfactory, with mills quite busy. Some producers quote \$2.25, Youngstown, or \$2.29½, Pittsburgh, but \$2.25, Pittsburgh, can be done, and there are rumors that one or two sales have been made at a slightly lower figure.

Rods.—The market on Rods is very firm, with Bessemer at \$37 to \$37.50, and Open Hearth, ordinary carbons, at \$38 to \$38.50, f.o.b. Pittsburgh.

Sheets.—Demand is quite satisfactory and somewhat improved, owing to lessened prospects of labor troubles. The leading interest continue their official quotations, but are practically sold up. Independent mills are quoting considerable premiums to ordinary inquirers, but are taking care of their regular customers at the ruling figures. We quote Black Sheets as follows: Nos. 22 and 24, Box Annealed, one pass through cold rolls, 2.45c.; No. 26, 2.55c.; No. 27, 2.65c. to 2.75c., and No. 28, 2.75c. to 2.85c. Galvanized Sheets are very firm and some mills are quoting on the basis of 75 and 5 off, which for No. 27 is equal to 3.80c., and for No. 28, 4.04c. A few mills continue to quote in large lots at 75 and 7½ to 75 and 10 off. The lower price, however, is exceptional and is made by only a few mills and on very attractive orders. For small lots jobbers charge the usual advances.

Merchant Steel.—The market is unchanged, there being a fair demand, with prices very firmly held. We quote: Tire Steel, 1.80c. to 1.90c.; Open Hearth Steel, ordinary grades, 1.70c. to 1.80c.; Open Hearth Spring, 2.25c. to 2.35c.; Cant Hook Steel, 2.50c.; Plow Slabs, Bessemer, 2.50c.; Plow Slabs, Open Hearth, 3.75c.; Tool Steel, ordinary grades, 6½c. and upward; Cold Rolled Shafting, 42 per cent. off in less than carloads, and 47 per cent. in carloads, delivered in base territory.

Hoops and Bands.—There is a good run of orders for Hoops and Bands, Cotton Ties being quiet, as the season is about over. We quote: Cotton Ties at 88c. in 5000-bundle lots and over, and 91c. for less quantities. Steel Hoops are 1.90c. on 200-ton lots and over, and 2c. in less quantities. Bessemer Bands are 1.60c. up to No. 12 gauge, and Open Hearth, 1.70c., extras as per Steel card. These prices are f.o.b. makers' mill.

Pipes and Tubes.—No very large orders have been booked the past week, but the volume of ordinary business is quite large, and fully equal to current production, and mills are entirely satisfied with the outlook. Early deliveries, especially of Steel Pipe, are hard to get. Prices are firmly held, discounts to consumers in carload lots are as follows:

Merchant Pipe.

	Steel.		Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
1/8, 1/4 and 3/8 inch.....	68	58	65	55
1/2 inch.....	70	60	67	57
3/4 to 6 inches.....	75	65	72	62
7 to 12 inches.....	69	59	66	56
Plugged and Reamed:				
1 to 4 inches.....	73	63	70	60
Cut 3 to 6 feet:				
1/8, 1/4 and 3/8 inch.....	63	52	60	49
1/2 inch.....	65	54	62	51
3/4 to 6 inches.....	71	60	68	57
7 to 12 inches.....	65	53	61	50
Cut 6 feet and longer:				
1/8, 1/4 and 3/8 inch.....	64	53	61	50
1/2 inch.....	66	55	63	52
3/4 to 6 inches.....	72	61	69	58
7 to 12 inches.....	66	54	62	51
Extra Strong Plain End:				
1/8 to 8 inches.....	67	57	63	53
Threads only.....	66	56	62	52
Threads and Couplings.....	65	55	61	51
Double Extra Strong Plain End:				
1/8 to 8 inches.....	59	49	55	45
Threads only.....	58	48	54	44
Threads and Couplings.....	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12 1/2 per cent. advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 per cent. net for 6 feet and longer, and 15 per cent. net for 3 to 6 feet. We may note, however, that on Iron Pipe some of the outside mills are naming slightly lower discounts.

Coke.—There is a good deal of Coke offered for resale by furnace interests, which during the scarcity contracted for more than they needed, and prices are quite irregular. There is no disposition to place contracts for second half. Prompt Furnace Coke, in lots of a few carloads, can be had at 3.65 to \$4, while on contract Furnace Coke is nominal at \$3.50. There is a possibility that Coke shipments may be interfered with again when the Ore and grain movement becomes heavy, otherwise still lower prices are in prospect. Prompt Foundry Coke is \$5 to \$5.50, with very little demand. Production in the Upper Connellsville region last week was 251,000 tons and in the Lower Connellsville region 51,320 tons, making a total of 302,320 tons, or a little over 1000 tons gain over the previous week. The production of the Lower Connellsville region was the largest in its history.

Old Material.—There is very little movement in the Scrap market, and prices, with the exception of Heavy Melting Stock, are inclined to be weak. The last sale of Crop Ends was at \$22, but this might possibly be shaded. We quote ordinary lots of Heavy Melting Stock at \$21.50. Low Phosphorus stock continues hard to get.

Trade Publications.

Air Hammers.—The Haeseler-Ingersoll Pneumatic Tool Company, 26 Cortlandt street, New York, have issued a pamphlet describing their axial valve hammers. In this the valve is a radical departure from the various forms of straight line reciprocating valves ordinarily used. As its name implies its movement is around a fixed axis, the travel forward and back, to alternately open and close the admission and exhaust ports, being caused by a constant air pressure upon the short wing of the valve and intermittent air pressure upon the long wing. The ports in the valve, as well as those in the valve box, are relatively of equal areas, and are located diametrically opposite to each other, so that any pressure against either side of the valve is equalized by a corresponding pressure upon the other side, resulting in a perfectly balanced valve and a consequent absence of friction.

Photographic Printing Machine.—A circular by the Keystone Blue Paper Company, 910 Filbert street, Philadelphia, describes the Keystone electric photographic printing machine. This apparatus is designed to print various printing out papers as albumen, collodion, platinum, &c. Only one arc lamp is required to print eight negatives, 11 x 14 inches, one of which is placed in each of the compartments of the machine, which is octagonal in form and occupies a floor space of about 3 x 3 feet. The lamp used is an inclosed arc of special design and construction fit for photographic printing. The rays from the light are actinic to a very high degree, and are free from the impurities which sometimes render sunlight printing slow and more or less imperfect.

Wyman & Gordon, manufacturers of high grade drop forgings, Worcester, Mass., publish "A Short Story of John Stevens and His Sons" as one of the series of biographies of famous inventors which they are issuing in the place of a catalogue. It is a most interesting history of a remarkable family.

Lathe Tool.—The Jaques-Bush Mfg. Company, 71 Eagle street, Providence, R. I., have issued a circular describing the Jaques patent lathe tool, referring to the device

as practically eight tools in one. The larger cutter, with four points, being for general work; the small cutter, with two points, for work where the thread runs close to a shoulder of large diameter, while the other two are concave and convex for finishing purposes. After the holder is placed in the tool post it should not be disturbed, as when one point becomes dull the cutter is simply turned and the new point will strike into the exact position of the one removed. This process may be repeated until all the points are dull, when the cutter should be removed from the holder and the top of the four points ground at one time. The manufacturers state that the saving of time will soon pay the cost of the tool, and that their use will avoid the annoyance of grinding to form, as the angles of these tools remain the same until the points are all ground away.

Mond Gas.—R. D. Wood & Co. of Philadelphia, who have for many years been manufacturers of gas plants, have secured the right for the Mond process in the United States. In a handsomely illustrated volume just issued they have collected a mass of information relative to the Mond producer, with recovery of by-products. The work includes a full description of the process, and gives the results obtained at many of the large number of plants in which it has been adopted. With the recent rapid developments of the gas engine, both in small and in large units, the Mond process deserves, and will obtain, widespread recognition in this country.

The Loomis-Pettibone Gas Machinery Works.

The Loomis-Pettibone Gas Machinery Company, 52-54 William street, New York, recently incorporated with a capital stock of \$2,000,000, are about to begin the construction of a large plant near New York for the manufacture of gas engines in large units, in addition to the Loomis-Pettibone gas apparatus, which they will continue to manufacture as heretofore.

The company are now prepared to enter into contracts for the equipment of complete plants, gas generators, gas engines and electric generators and motors. Until their own plant is ready to turn out large gas engines they will deliver the engines manufactured by Cronley Brothers, Limited, of Manchester, England, as they have their exclusive agency for North America. The company claim that they are now producing power with a consumption of 2 1/2 pounds of wood per brake horse-power hour, or with 1 pound of good bituminous coal.

They have installed a number of large gas engine plants in the United States and Mexico, including Minas Tecolotes Y Anexas, Guggenheim Exploration Company, owners, Santa Barbara, Chihuahua, Mexico, 700 horse-power; Montezuma Copper Company, Phelps, Dodge & Co., owners, Nacosari, Sonora, Mexico, 1000 horse-power; Detroit Copper Mining Company, Phelps, Dodge & Co., owners, Morenci, Ariz., 1000 horse-power; Winchester Repeating Arms Company, New Haven, Conn., 1000 horse-power. Among recent contracts are the Velardeña Mining & Smelting Company, Velardeña, Durango, Mexico, 2000 horse-power of gas engines, operating from a central power station, an ore concentrating mill, pumps and hoists at six of the mines of the company, the same being variously located within a radius of 10 miles; Rockland Electric Company, Hillburn, Rockland County, N. Y., 1200 horse-power of gas engines operating direct current electric generators for furnishing power and light; Potosina Electric Company, San Luis Potosi, Mexico, about 600 horse-power of direct connected gas engines furnishing electricity for power and light.

The officers and directors are Benjamin Guggenheim, president; Cyrus Robinson, first vice-president and general manager; Burdett Loomis, Jr., second vice-president and manager sales department; Leon P. Feustman, secretary and treasurer; Burdett Loomis, Sr., consulting engineer; Hawley Pettibone, chief engineer, and Charles E. Finney.

Parties interested in the Allegheny Steel & Iron Company, Pittsburgh, are taking out a charter with the name of the Inter-State Steel Company, and will erect a two-mill sheet plant to make Russia iron. It was at first intended to erect the new plant adjoining the present one at Avenue, Pa., but several flattering offers have been received from other towns, and it is possible one of them may be accepted.

Electricity for Gas Works Operation.

An interesting gas power plant is now being installed at the works of the Milwaukee Gas Light Company, Milwaukee, Wis. The company are erecting a new gas works which will be one of the largest in the country, and will embody the most advanced practice in modern gas engineering. Although no electricity will be generated for outside lighting, a gas engine driven electrical plant will be employed for furnishing motive power to the various auxiliaries throughout the works, including a large machine shop, all of which will be operated by electric motors. Coal will be unloaded from boats, elevated to the storage bins by electrical hoists and conveyors, the retorts will be charged and drawn by electrical appliances, and the final disposition of the coke will be accomplished by means of electric power apparatus. The entire electrical distribution system will operate at 250 volts, direct current, from a central power generating plant, employing gas engines connected directly to the gas mains.

The present equipment comprises a 250 horse-power Westinghouse horizontal double acting gas engine, driving a 150-kw. generator, and three 125 horse-power vertical engines, belted to 75-kw. generators. Provision has been made for future extensions of the equipment with a second power unit of the former type. The 250 horse-power engine is of the new horizontal type recently introduced by the Westinghouse Company for general power work. Its principal features are a pair of horizontal cylinders arranged in tandem and operating upon the double acting principle, a single crank and water cooled pistons, cylinders and combustion chambers. The engine is particularly adapted to generator driving by reason of its excellent speed regulation, due to the method of governing employed, which at each stroke proportions the explosive charge to the load but maintains at all times a mixture of constant quality.

The H. C. Frick Coke Company.

PITTSBURGH, PA., May 6, 1903.—The H. C. Frick Coke Company of Pittsburgh, Pa., have made official announcement that the H. C. Frick Coke Company, Southwest Connellsville Coke Company, American Coke Company and Continental Coke Company have all been merged under the corporate name of H. C. Frick Coke Company. The officers of the company are as follows: Thomas Lynch, president; D. H. Coble, secretary; Philip Keller, treasurer; W. S. Armstrong, assistant treasurer; C. P. Parker, auditor; J. D. McCreery, assistant auditor; C. H. Spencer, general agent; T. S. Duncan, purchasing agent. The office of vice-president is vacant. Other officials are the same as served under the old H. C. Frick Coke Company.

In connection with the speed trials of the new British armored cruiser "Drake," in which a speed of 24 knots was obtained while running at full power, experiments were carried out with a new type of propeller, the blades of which are almost circular in shape, instead of the present approach to the oval form. By this arrangement the screws obtain a more powerful grip of the water. Owing to the conspicuous success which attended the speed trials of the "Drake," since the maximum speed contracted for was only 23 knots, it is proposed to carry out further tests with this form of propeller upon other vessels.

The Stilwell-Bierce & Smith-Valle Company have secured a contract from Vicente Usera of Ponce, Porto Rico, for the installation of a complete system of water works. There will be two compound pumping engines, with a combined daily capacity of 5,000,000 gallons, and a boiler plant consisting of three units of 150 horse-power each. Four hundred tons of cast iron pipe, varying from 6 to 14 inches in diameter, will be required for the mains. The value of the contract entire is stated to be upward of \$60,000.

Birmingham.

BIRMINGHAM, ALA., May 5, 1903.—(By Telegraphy.)

The Iron market continues irregular, being quoted on the basis of \$17.50 down to \$16.25 for No. 2 Foundry, with difference of 50c. between grades. These quotations are for prompt delivery. The most active sellers report increased inquiry and sales at outside prices. There are special circumstances surrounding minimum prices. There can be no question as to increased inquiry, but it is confined mainly to first half the year. Very large buyers have taken all the Forge Iron they could obtain without satisfying requirements.

There is great activity in Ore and Coal properties with some propositions concluded, one being for over 30,000 acres of land carrying Iron Ore, Coal and Limestone, the Louisville & Nashville Road being the seller. There will be erected a furnace plant on this property and a large Coke plant. There are large propositions for other plants under consideration, involving hundreds of thousands of dollars. Some of them are backed by parties well known in Iron circles, and the probabilities strongly point to the acquirement of properties favorably situated for the establishment of Iron and Steel industries. There was one sale of 1000 acres of desirable lands at \$100 per acre. There never has been such active and thorough examination of offering properties, and experts are continually on the go. A continuous season of activity is promised, and a material addition to our Iron and Steel output seems well assured.

Iron and Industrial Stocks.

Among the interesting developments of the week was the sharp advance in Chicago Pneumatic Tool at Chicago. This stock, which sold down to 35 two weeks ago, has been in active demand this week at as high as 65. Better prices are predicted, as the company are doing a large business. It is reported that the differences in the management of the company will be adjusted within a very short time, and the payment of dividends will be resumed. It is further reported that the money with which to pay the dividend due April 25 has been set aside. The general market for industrials has been quite firm without any material change in prices, except in the case of American Can preferred, which advanced from 42½ to 45½, and Dominion Steel which rose from 27½ to 31. The new United States Steel 5's were steady throughout the week at about 85.

Nova Scotia Steel & Coal Company.—The Boston Stock Exchange has listed 37,623 shares of an authorized issue of 50,000 shares of common stock of the Nova Scotia Steel & Coal Company, and 10,300 shares of an authorized issue of 20,000 preferred, par \$100. The company were incorporated March 11, 1898, under special act of the legislature of Nova Scotia. In addition to the stock as above there are \$2,500,000 6 per cent. 30-year first mortgage bonds dated July 1, 1901. John F. Stairs is president and Thomas Green, secretary. The following is a list of the directors: John F. Stairs, Thomas Cantley, L. Melvin Jones, James C. McGregor, Robert Reford, Graham Frazer, Harvey Graham, R. Jaffray, G. F. MacKay, John McNab, J. Walter Allison, R. E. Harris, James D. McGregor, J. S. Pitts, George Stairs. The following is a condensed balance sheet as of December 15, 1902:

Resources.	
Accounts receivable.....	\$304,931
Calls on capital stock subscribed.....	172,275
Bills receivable.....	147,302
Cash in bank.....	405,084
Total.....	\$1,029,593

Debts.	
Bills and accounts payable.....	\$75,794

The principal office of the company is at New Glasgow, Nova Scotia, the transfer agent is the Boston Safe Deposit & Trust Company, and the Old Colony Trust Company is registrar.

The stockholders of the Detroit Steel & Iron Company, Delray, Mich., held their initial meeting on April 28, the full amount of the stock subscribed—\$750,000 of preferred and \$750,000 of common—having been paid in. By-laws were adopted and routine business transacted.

Dividends.—National Steel & Wire Company have declared the regular quarterly dividend of 1½ per cent. on the preferred, payable May 6. Books close May 1 to May 6, inclusive.

Ashton Valve Company have declared a regular quarterly dividend of 1½ per cent., payable May 15, to stock of record May 1.

Warren Steam Pump Company have declared a semi-annual dividend of 2½ per cent., payable July 1. Books close June 15 and reopen July 2.

Drawback on Imported Lead and Steel Hoops.

The Treasury Department announces that the regulations of April 20, 1901, in the matter of drawback on white lead "dry" or "in oil" manufactured by William J. Matheson & Co., Limited, of New York City, are extended, as far as applicable, to similar manufactures by Harrison Bros. & Co., Incorporated, of Philadelphia, Pa., from none but imported metallic lead. In liquidation, the quantities of metallic lead which may be taken as bases for allowance of drawback may equal the quantities used as declared in the drawback entry and shown by a sworn abstract of the manufacturers' records attached to the drawback entry.

Announcement is also made that the regulations of November 26, 1892, establishing a rate for the allowance of drawback on petroleum barrels manufactured by the Tidewater Oil Company of New York, and bound with hoops made from imported hoop steel, are extended, as far as applicable, to barrels for refined cotton-seed oil manufactured by the Kentucky Refining Company of Louisville, Ky., and bound with hoops made from imported hoop steel. The quantity of steel so used shall be determined by allowing 14 pounds for each barrel bound with hoops of No. 18 gauge of the following dimensions: Two hoops $1\frac{1}{2}$ inches wide, 6 feet $6\frac{1}{4}$ inches long; two hoops $1\frac{1}{2}$ inches wide, 6 feet $3\frac{1}{4}$ inches long; two hoops $1\frac{3}{4}$ inches wide, 6 feet $\frac{3}{4}$ inch long, and two hoops $1\frac{1}{4}$ inches wide, 6 feet $10\frac{1}{4}$ inches long.

Steam Turbines.—The steam turbine plant of the Hartford Electric Light Company, Hartford, Conn., which at present consists of a 2000 horse-power set, is soon to be duplicated by machines built by the contractors for the original installation, the Westinghouse Machine Company. This was the first American plant installing steam turbine units of large size, and their complete success is highly gratifying to the makers. In its application to the generation of electrical power the Westinghouse steam turbine is undoubtedly making marked progress. As an evidence of the energy with which the manufacture of these machines is being taken up, it may be interesting to state that the aggregate power of steam turbine sets completed in hand and in order to the Westinghouse Machine Company does not fall far short of 200,000 kw.

Federation of French Manufacturers and Merchants.—Simon W. Hanauer, United States Deputy Consul-General at Frankfurt, Germany, reports that an organization has been effected in Paris under the above title, and a strong effort is being made to get all manufacturers and export merchants of France to join. The organization is to be divided into different groups, which will systematically work for the following objects: To prepare for and bring about commercial treaties; to create and maintain colonization societies, associations for export trade, shipping lines, &c.; a protective league against bad debtors, and a trade and technical union to foster technical schooling. The different groups are to be endowed liberally, and it is expected that French commerce and manufacturing, which has not kept pace with other nations, will receive a mighty impulse from this movement.

G. S. Scott and J. Winchester Holman have purchased the *Western Mining World*, published at Chicago. Mr. Holman has for the past two years represented the *Engineering and Mining Journal* at Chicago. Mr. Scott also for the twelve years previous to January, 1902, represented the same paper at Chicago, but since then has been Chicago manager of the *Mining and Scientific Press*. They will issue the paper as the *Mining World*, enlarging it considerably and making other improvements.

Government receipts for the month of April amounted to \$43,326,100, while the sum of the expenditures was \$41,762,000. For the ten months ending with April the receipts amounted to \$466,419,501, as compared with expenditures aggregating \$431,026,177. The receipts thus exceeded the expenditures by \$35,393,324. The Government's income from customs continues to grow in volume.

New York.

NEW YORK, May 6, 1903.

Pig Iron.—The market is exceedingly quiet, sales being restricted to a minimum. There have been some cancellations of Foreign Foundry Pig, against which there seems no redress, and similar complaints have also been heard from sellers of domestic Pig. Prices are somewhat nominal. We quote, at tidewater, for prompt to early delivery: Northern No. 1, \$21.75 to \$22.50; No. 2, \$20.25 to \$20.60; No. 2 Plain, \$19.75 to \$20.25. Tennessee and Alabama brands in New York and vicinity: No. 1, \$21 to \$21.50; No. 2, \$20.50 to \$20.75; No. 3 Foundry, \$19.75 to \$20.

Steel Rails.—The demand is moderate, and only small lots are being sold. Deliveries from the mills which had improved have lately been a little backward again. It is reported that the Lackawanna plant is to roll Rails certainly on October 1, if not before that date. For prompt shipment the foreign makers are holding prices firm, but for later delivery they are making concessions. We continue to quote \$28, at mill, for Standard Sections.

Cast Iron Pipe.—The Eastern foundries continue well supplied with work, notwithstanding the dearth of large orders. Small quantities are in constant demand, and in some instances the urgency is so great for early delivery that buyers are obliged to seek for a foundry in position to handle them. From present appearances the Eastern works will have no difficulty in securing sufficient business to run them well through the season. Strong expectations are entertained that some large orders will come in the market at an early date, but they are slow in developing. Prices on carload lots continue at \$36.50, gross ton, at tide water, for 6 and 8 inch, and \$35.50 for 12-inch upward.

Finished Iron and Steel.—The American Bridge Company have booked a fair tonnage, consisting mainly of railroad work, comprising orders ranging from 600 to 3500 tons. April was their best month in point of tonnage this year, the total booked being about 40,000 tons. The company look for a heavy increase this month, as many good contracts are pending. Building prospects are brighter in this city. Several large buildings which have been contemplated for some time are to be placed under contract, with the expectation of pushing them to completion as speedily as possible. The labor troubles in the building trade are regarded as temporary, and it is confidently believed that the situation will soon be cleared. Orders are now being placed more freely for Plates as a result of the settlement of the wages question in the local shipyards and boiler shops. The terms upon which the settlement was made are considered favorable to employers, the labor representatives having receded from their extreme demands. The Plate orders placed during the week were not large, but were more numerous than has recently been the case. One of the orders was for about 200 tons for a boat. Prices on Plates are well maintained, ranging from 1.90c. to 2c., delivered, for the bulk of the business now being entered. On large orders, involving 500 tons or more, buyers are able to secure the Pittsburgh basis. Trade in Bar Iron is quiet. Arrangements have not yet been completed for bringing all the Eastern mills into the association, but it is confidently expected by those who are working with them that this object will be successful. If this is done Eastern business will be placed on a much more solid basis. We quote, at tidewater, as follows: Beams, Channels and Zees, 1.75c. to 2c.; Angles, 1.75c. to 2c.; Tees, 1.80c. to 2c.; Bulb Angles and Deck Beams, 1.90c. to 2.25c. Sheared Steel Plates, in carload lots, are 1.90c. to 2c. for Tank, 2c. to 2.10c. for Flange, 2.10c. to 2.20c. for Marine and 2.35c. upward for Fire Box. Refined Bars are 1.95c. to 2c.; Soft Steel Bars, 1.75c. to 1.90c.

Old Material.—Steel Melting Scrap is in better demand than other classes of Old Material, and prices are well maintained. The rolling mills are buying very little stock, as they are awaiting developments. If the mills are all brought into line to maintain prices on Bar Iron, it is expected that less hesitation will then be shown in covering requirements. Cast Scrap is quite weak, being influenced by the better supply of Pig Iron. Old Car Wheels are neglected, and prices are considerably lower. The inquiry for Relaying Rails is picking up on account of the slow delivery of new Rails by the Steel works. Prices have therefore advanced, and it is no longer possible to secure Relayers at the low rates prevailing during the past two weeks. We quote, f.o.b. cars, vicinity New York, per gross ton, as follows:

Old Iron Rails.....	\$24.50 to \$25.00
Old Steel Rails, long lengths.....	22.00 to 22.25
Old Steel Rails, short pieces.....	19.25 to 19.50
Relaying Rails, heavy sections.....	27.00 to 28.00
Relaying Rails, lighter sections.....	29.00 to 30.00
Old Car Wheels.....	21.00 to 22.00
Old Iron Axles.....	30.00 to 30.50
Old Steel Car Axles.....	25.50 to 26.50
Heavy Melting Steel Scrap.....	19.25 to 19.50
No. 1 Railroad Wrought Scrap Iron.....	22.50 to 23.50
Iron Track Scrap.....	19.50 to 20.50
Wrought Pipe.....	15.50 to 16.00
Ordinary Light Iron.....	11.00 to 12.00
No. 1 Machinery Cast Scrap.....	18.00 to 19.00

Stove Plate.....	13.50 to 14.00
Wrought Turnings, delivered at mill...	17.00 to 17.50
Cast Borings, delivered at mill.....	11.50 to 12.00

Owing to the necessity of obtaining more room Robert W. Hunt & Co., Bureau of Inspection and Tests, have removed their office from 71 Broadway to 66 Broadway.

The American Iron & Steel Mfg. Company have opened a New York sales office at rooms 612, 613 and 614, Postal Telegraph Building.

Metal Market.

NEW YORK, May 6, 1903.

Pig Tin.—The Tin market has been very quiet, fluctuating during the week between the range of 29.90c. to 30.25c., and closing for spot and June at 29.90c. to 30.10c. London fell off to £135 15s., but is back to-day to £136 for spot and futures. According to the monthly statistics of the Metal Exchange the total visible supply on April 30 was 382 tons above that on the corresponding date last year.

Copper.—While the large selling interests insist that they are marketing their product at close to 15c., evidence is accumulating in the market that Copper is really available at considerably lower prices. There are reports that Casting Copper has been offered in round lots down as low as 13.90c., and that Standard Lake brands are obtainable at under 14.75c. The London market closes at £61 17s. 6d. for spot and futures with Best Selected at £66. April exports are estimated by the Metal Exchange at 13,380 gross tons.

Pig Lead.—The market is unchanged at 4.37½c. for carload lots of Desilverized, New York delivery. London closes at £12 1s. 3d.

Spelter.—Spelter is quiet, but firm at 5.75c. for spot, with London cabling £21 15s.

Antimony.—We quote Cookson's at 7½c.; Hallett, 7c., and other brands at 6½c. The market is weak.

Nickel.—We continue to quote 40c. to 45c. for large quantities and 50c. to 60c. for small lots.

Quicksilver.—The market is \$47.50 for flasks of 76½ lbs.

Tin Plate.—Production is being rushed in anticipation of the coming season. The official quotation continues at \$3.80 for box of 14 x 20 100-lb. Cokes, f.o.b. mill, which is equivalent to \$3.99, New York.

The New York Machinery Market.

NEW YORK, May 6, 1903.

Market conditions show no material change, the trade in general continuing good, or as one manufacturer expressed it, "healthy." Inquiries are numerous, but the closing of contracts has showed up considerably, which is due, no doubt, to the anticipated labor troubles around May 1. Now that these have been practically averted, it is expected that many deals which have been pending for some time will be consummated.

Machine tool manufacturers are centering their attention on the contemplated improvements to the meadow shops of the Pennsylvania Railroad, between Jersey City and Newark, N. J., and are expecting to see the list of tools required issued within the next few weeks. We are advised that the matter is now up to headquarters and a definite statement can be expected at almost any time.

Another project of interest to the trade is the enlargement of the machine and repair shops of the Lehigh Valley Railroad, at Sayre, Pa., which we understand are to be more than doubled in size. It will be remembered that about half the equipment was purchased the latter part of March, and now the question is, How about the other half?

The Blake & Knowles Steam Pump Works of the International Steam Pump Company, New York, will spend between \$200,000 and \$300,000 in improvements to their plant at Cambridge, Mass. The works have been cramped for room for some time, particularly in the machine shops, and to make room for the tools the pattern shop will be housed in a new building and a new warehouse will be erected. The machinery requirements will not be large, but several machine tools and new boilers for heating purposes will be purchased. The recent incorporation of the Blake & Knowles Steam Pump Works, with a capital stock of \$1,455,000, was simply for the purpose of changing the company from a foreign to an American corporation, the European business of the company having been taken over by the recently incorporated Worthington Pump Company, Limited, of London.

The Lidgerwood Mfg. Company, 96 Liberty street, New York, expect to have plans ready for their new plant at

Newark, N. J., about June 1. The first buildings to be erected will be a foundry and power house, for which 250 horse-power of engines and boilers will be required. Later this equipment will be increased to 1200 horse-power.

The American Mfg. Company, 65 Wall street, New York, manufacturers of transmission rope, have inquiries out for a boiler and engine of from 300 to 400 horse-power, for their plant at Kent avenue and Knowles street, Brooklyn.

Considerable equipment will be required by E. B. Meyrowitz, optician, 104 East Twenty-third street, New York, for the new plant he is to erect at First avenue and Thirty-first street, on an L-shaped site, 50 x 100 x 50 x 100. Plans are now being prepared, and just what machinery will be needed is not yet known.

The Ludlow Valve Mfg. Company, Troy, N. Y., have purchased the property of the Troy Steel Products Company, consisting of 9 acres on which there are several buildings. While no particulars are at hand, there is little doubt but that the company intend to build extensively this coming summer.

The Long Acre Electric Light & Power Company, recently incorporated, have perfected plans for the installation of an electric plant for furnishing light and heat to many of the theaters in New York. Several theatrical managers are interested, among whom is William Harris, business manager of the Garrick Theater.

L. C. Smith, one of the leading benefactors of the L. C. Smith College of Applied Science, at Syracuse, N. Y., is said to be planning to enlarge the quarters from one building to four. The amount of money that will be expended in construction and equipment has not been made public. According to the present plans, which are as yet in the preliminary stage, the first building will be 50 x 200 feet, two stories and basement, and will be used for electric, hydraulic and steam engineering; the second will be used for the different wood working shops and for drafting rooms, and the third, about 200 feet long, will be fitted up for forge and foundry work. A new heating plant is to be erected this summer, in which will be installed the most modern equipment obtainable.

T. H. Buckley of Worcester, Mass., has bought a large tract of land adjoining the property of the Graton & Knight Mfg. Company, and is to erect on it large shops for the building of steam and electric cars. Architects are now at work on plans. It is understood that the shops will have the usual quota of machine shop equipment. Mr. Buckley is a manufacturer of night lunch carts.

Henry R. Worthington, 114 Liberty street, New York, are shortly to bring out a new centrifugal pump for high lifts, which is said to be particularly adapted for mine service. They have already received orders for a large number of these pumps.

Stehli & Co., 105 Greene street, New York, are to install a complete electric power plant in their mill, at Lancaster, Pa., in place of the present steam plant. So far only the engine and generator have been secured, and the order, which is a good sized one, was captured by McClave, Hamilton & Co., 85 Liberty street, New York, who have also closed with the Winthia Knitting Mill Company, Richfield Springs, N. Y., for a 200 horse-power electric drive.

The Bureau of Supplies and Accounts of the Navy Department have issued a schedule of supplies combining the requirements of all the Eastern navy yards at the present time, in order to give bidders the opportunity of competing for deliveries at all yards, as well as at one, at the same time and under one proposal. Heretofore the general practice has been to issue a schedule for each yard separately. By combining purchases as far as practicable, it is hoped to secure a broader field for competition. All proposals issued by the department contain full information, specifications and instructions to intending bidders. While they provide for a guarantee to accompany the bid to cover execution of contract in case award is made, upon furnishing satisfactory assurances concerns are permitted to file a general guarantee covering all bids which they may submit, and thus avoid the formality of securing the execution of a separate guarantee for each proposal. Bids are opened and recorded at stated times at the Navy Department, Washington, the next opening of a general proposal for supplies being at noon, May 19. Blank schedules upon which to make bids may be obtained on addressing the purchasing pay offices of the navy, situated in all the principal seaport cities, or the Bureau of Supplies and Accounts, Navy Department, Washington, D. C.

Mr. Hilton of the Fort Wayne Foundry & Machine Company, who has just returned to Chicago, denies that there is to be a change of the name of the Fort Wayne Company to the Chicago Car Wheel & Foundry Company. The report had previously been confirmed by those in a position to know the intention.

Walter Scranton, president of the Lackawanna Steel Company, last week lighted the second of the Buffalo blast furnaces. The company also blew in a furnace each at Lebanon and at Cornwall, Pa.

Chicago Machinery Market.

CHICAGO, May 2, 1903.

The call for new machinery during the month of April has come largely from the railroads of the country, both steam and electric, and from steel manufacturing plants. This has been especially noticeable in the line of engines and boilers, but it is also true of machine tools and general supplies. It is significant that these buying interests are still the most important factors in the market, some very large contracts pending both in the East and West. In Chicago during the month of May contracts for between \$300,000 and \$400,000 for engines alone will probably be closed, the South Side Elevated being among the important buyers in the market. Other elevated roads have been conspicuous during the month in making purchases.

Several of the largest local manufacturing interests are deeply interested in the outcome of pending contracts in New York City, aggregating between \$3,000,000 and \$4,000,000. This includes equipment for the subway and elevated roads. The New York Central is also a prospective buyer. Latterly considerable preference is said to have been given by electric lines to the steam turbine, but it is claimed that more recently there has been a reaction in favor of the reciprocating engine. This will be determined more definitely when contracts are let which are expected to be consummated within the next 60 days. Among the important railroads who have figured largely as buyers, as noted in recent correspondence, are the Pennsylvania, Illinois Central, Tacoma & Eastern, Kansas City, Mexico & Orient, Chicago, Indianapolis & Louisville, Chicago, Burlington & Quincy, Santa Fé and Lake Shore. Several railroads running into the southwestern territory, as well as the Chicago, Milwaukee & St. Paul and one or two other Northwestern roads, are now said to be in the market for equipment of various kinds, including isolated plants along the lines of the roads as well as for cars and locomotives.

One of the largest manufacturers in this district notes that sales during the last few months show about \$1,500,000 increase over the corresponding time a year ago. Other manufacturers of engines and machine tools, who confine their estimates to the month of April, report a substantial increase as compared with April, 1902, some of them as much as 50 and 75 per cent. It should be noted, however, that there are several important exceptions to the rule.

There has been some falling off in business at irregular intervals experienced by most of the manufacturers, but this has been almost invariably followed by an accelerated trade. It is claimed that on large contracts, especially in the engine line, there has been a disposition shown recently to make lower prices, resulting from keen competition. In the tool line, however, prices are reported to be well maintained, the increased cost of manufacture, due to higher wages, being reflected more especially in this department. One or two manufacturers note some slowness in the collection of accounts; but, as a rule, there are few complaints of this nature.

Inquiries develop the fact that many foundries are melting heavier than a year ago, and orders for rough castings indicate an increase in the melting during the third quarter if not during the entire last half of the year.

During the last two weeks some hesitation, more or less, has been perceptible, incidental to labor difficulties and the indisposition to place orders, especially by railroads, until the beginning of the next fiscal year. It is notable, however, that contracts are being placed with the proviso that bills shall not be presented until the next quarter. There are indications that the increased capacity of nearly all manufacturers of machinery will find full exercise during the remainder of the second and third quarters of the year, but what is more significant is that further improvements and additional equipment are being provided for.

Some manufacturers of machine tools are still running their factories at full capacity day and night. A reduction in the number of large equipments being sold is noted by some, but a more healthful demand for such machinery as indicates moderate extension of plants already built has been experienced.

Summing up the entire situation, it would seem that with the labor difficulties satisfactorily adjusted, and a fair maintenance of the present crop prospects, continued activ-

ity will be a feature of the machinery industry throughout the remainder of the year, the prospect being for a volume of business equal to if not greater than that which was experienced during 1902.

Engines, Boilers and Pumps.

The Allis-Chalmers Company, Chicago, report the volume of business on the books of the company at present as greater than at any time since the organization of the company, notwithstanding that the output of the plants has been increased to a large extent. The trade in engines has been especially heavy during the month of April, some very important orders having been taken in the Chicago district during the month, including one for the Union Loop Company, estimated at about \$40,000. Orders have already been secured which will keep the plants running at full capacity for many months. While considerable foreign business is still being received, the domestic field is much more profitable because of the lower prices prevailing abroad and the greater competition arising from the adoption of American methods by Europeans. Some large business is said to be in sight both in the East and West. The company have for several years been investigating the subject of steam turbines, and have recently made arrangements to manufacture turbines at Milwaukee. The demand at the present time, however, seems to be more in favor of the reciprocating engine. Electric railways and steel plants have been the largest customers recently, and a number of important contracts of this character are pending. The company are preparing to greatly improve the Scranton, Pa., works, where \$100,000 to \$150,000 will be spent upon remodeling and equipping the plant.

The Otto Gas Engine Company, Chicago, report that the volume of business in April in gas engines was about equal to that of April last year, and that the prospect for future trade is highly encouraging. Orders already on the books will keep the plant in active operation for several months, and there is a very large amount of work pending. The demand comes largely from steam railroads for isolated plants, such as for pumping stations, rock crushing, electric lighting and coal hoisting. During the last quarter of the fiscal year in railroads there is a general disposition to curtail expenses, and this inclination is reflected in the market for engines and other machinery. It is significant, however, that there is a very large amount of business for which contracts are virtually let, but are to be billed after the opening of the new fiscal year. Interesting features are the active demand for gas engines for pumping compressed air and operating pneumatic tools, and the urgent demand for small water plants throughout the Southwest, stipulation being made that shipment be made within a few weeks of the entire equipment, including pipe, tanks, stand pipes, engines and pumps. Considerable business of this kind is being figured on, and not a little of it has been placed in the last few weeks.

The Filer & Stowell Company, Milwaukee, Wis., report that they are well satisfied with the condition of business at the present time. There seems to be an enormous demand for Corliss engines and saw mill machinery. Sales made during the month of April, 1903, were over 50 per cent. greater than during the corresponding month of last year. The past month, however, was an especially good one, but business for the present year, as a whole, will not be much, if any, in excess of 1902. The company are erecting a new foundry, 200 x 400 feet, which will more than double their foundry capacity. Orders seem to be well distributed.

The American Steam Pump Company, Battle Creek, Mich., have done a steadily increasing business for the past four months. They have orders in hand and prospective business to run their factory to the end of the present year. They believe that 1903 will be the best year in the history of American manufacturing industry. They are running full handed in every department, and turn out all the work possible with present facilities. They expect to do the same relative amount of business for the last half of 1903 as the first six months.

The Charter Gas Engine Company, Sterling, Ill., say that there is a quiet time in their line just now, farmers and others being busy, and there is an opportunity for them to stock up, which they are improving. They expect to enlarge their capacity this spring, and believe that the increased facilities will find full employment. The increase will be largely made in their foundry.

The S. Freeman & Sons Mfg. Company, Racine, Wis., say that the outlook for a large business for the remainder of this year is very promising, there being no decrease in the number of inquiries for boilers especially. They expect to increase their output in the agricultural implement line very largely this year, and have recently purchased the power corn sheller and horse-power patterns and patents of the A. P. Dickey Mfg. Company, who have gone out of business. The company have also taken up the manufacture of the Buckeye junior feed grinder, recently manufactured by the Staver Carriage Company of Chicago. The sales made during the past month include several stand pipes and nu-

merous boilers to be shipped to buyers in New York and San Francisco as well as intermediate points.

The Union Steam Pump Company, Battle Creek, Mich., say that while their business, as a whole, has increased about 35 per cent. over the corresponding month of last year, there is somewhat of an indication of a falling off in the demand and slowness in meeting accounts.

The Quincy Engine Works, Quincy, Ill., advise us that business has been quite satisfactory with them, labor difficulties being the only trouble they have at present. Their machinists have been on strike for about three weeks.

The Weber Gas & Gasoline Engine Company, Kansas City, Mo., report that the volume of business during the first three months of this year, as compared with the first three months of 1902, shows considerable increase. At the present time trade is very good; orders are coming in freely, and enough business is booked to keep them running to full capacity to the middle of July. They contemplate a considerable increase in their plant during the coming year, but plans are not far enough along to give information at this time.

The Aetna Foundry & Machine Company, Springfield, Ill., say that they have had a good demand for their product, are sold three months ahead, and that with the activity in the coal industry in Illinois and adjoining States they look for an active demand throughout the year. The company have recently sold hoisting engines to the Sangamon Coal Company, Springfield, Ill.; the Clark Coal & Coke Company, Peoria, Ill.; Springfield Co-operative Coal Mining Company, Springfield, Ill.; Carterville & Big Muddy Coal Company, Lauder, Ill., and the Tuxhorn Coal Company, Springfield, Ill., the majority of which companies are sinking new mines. They believe that the volume of business for the last half of the year will exceed any they have ever had for the same period.

The Whitehead Machinery Company, Davenport, Iowa, report that the demand for second-hand boilers, engines and other steam power equipment is as great, if not greater, than anything they have heretofore experienced. This is especially true of medium sized equipment. The company say that the amount of machinery offered for sale is particularly large, indicating a continuance of renewals, alterations and enlargements. The demand comes chiefly from electric light plants, and many inquiries are also being received from flour mills.

Power Transmission Machinery.

The Northern Engineering Works, Detroit, Mich., say that orders booked for April show a decided increase over the same month of 1902, especially in the line of electric and hand power traveling cranes. The company materially increased their plant last fall, and have had no difficulty in keeping the increased facilities fully employed. They report the outlook for future business entirely satisfactory.

The Northern Electrical Mfg. Company, Madison, Wis., say that the condition of business with them is quite satisfactory. Their shop is full of orders, but increased facilities have enabled them to do better in the way of deliveries than heretofore. They are pushing to completion an extensive addition to their works and expect to occupy the new buildings about the middle of the year. Prospects for future orders are bright, and they see no cause for concern on that score.

The Stephens-Adamson Mfg. Company, Aurora, Ill., say that they have work enough on hand to keep their plant running for the next 60 days, and have a large volume of business in sight. Current orders and inquiries are quite satisfactory. They expect to use 50 per cent. more castings during the next three months than they did in the corresponding three months of last year. They have been adding somewhat to capacity within the last 90 days, and all appearances go to show that their full capacity is to be fully engaged in the manufacture of their product.

The Dodge Mfg. Company, Mishawaka, Ind., say that the volume of business which they are enjoying is in excess of that of last year at this time. They notice a reduction in the number of large equipments, but a more healthful demand for such machinery as would indicate moderate extensions to manufacturing plants already built. They have enough business booked to keep them busy for several months, with prospects for future orders fully as bright as they have been at any time during the past three years. There is no indication, as far as they are able to discern, of the increased manufacturing capacity of plants in the various industries being sufficient to cause any early overproduction. The indications are that they should find full employment throughout this year at least. Much seems to depend upon the nature of the crop; if that is good there will be no doubt about continued activity throughout the entire year. They are noting special action in and a very large business from the South and Southwest. They are melting about the same average of iron as they melted last year.

The Webster Mfg. Company, Chicago, say they have orders booked for months in advance, and the outlook for business is fully as good as last year. Orders are being received from all sections of the country and at good prices. The

first quarter of the year was ahead of the corresponding quarter of last year in sales, and they are working 15 per cent. more men than last year.

Special Machinery.

The Browning Mfg. Company, Milwaukee, Wis., report that their business for the month of April was fully 25 per cent. larger than for the month of April last year. The indications are that the business will continue to grow steadily. The demand for electric motors is decidedly on the increase, and the outlook is so encouraging that they have recently installed additional machinery.

The Novelty Iron Works, Dubuque, Iowa, believe that the crest of the wave of prosperity has been reached, due partially to the fact that many wants in the line of machinery and buildings have already been satisfied, while the demands of the labor element are more numerous than ever. Factories in all lines in Dubuque are curtailing their output pending the sales of large stocks now on hand. The slight break in prices of materials will create a waiting policy upon the part of consumers. Building operations have been practically suspended for a year in their section, owing to the aggressive attitude of labor organizations. The company report that while business is not any better than it was a year ago, they are obtaining a fair share in their line of manufacture.

The Vilter Mfg. Company, Milwaukee, Wis., say that contracts secured for Corliss engines, refrigerating and ice making machines during the past month were greatly in excess of the business taken during the corresponding month a year ago. Among the larger contracts taken was an ice plant for Arizona, one for Norristown, Pa., and another for Brownsville, Pa. In addition to these some smaller contracts were taken, and also some for Corliss engines. They report that their increased facilities will find full employment for a number of months to come, and they are still operating their works day and night. Their largest proportion of trade originates in the East.

The Adams Company, Dubuque, Iowa, report considerably more business during the month of April this year than for the same month a year ago. In fact, they say that their business has had a gradual and substantial increase for many months, and the continued interest in their foundry molding machines, snap flasks, &c., as well as machine shop specialties, shown by inquiries and orders, leads them to expect a highly satisfactory business for an indefinite period.

The Luther Bros. Company, North Milwaukee, Wis., report that they have not as yet seen anything that would indicate any recession in their line, which is largely in advance of last year and continues to hold the increase noted. They believe the farmer is generally prosperous and in a position to maintain his buying power for some time to come.

The D. Clint Prescott Company, Menominee, Mich., state that their plant is being operated night and day, and with present contracts on hand for machinery will carry them well through the summer months. As compared with the same time last year, they say they have nearly doubled the orders on their books, and their facilities have been greatly increased. They are now building an addition to their machine shop, which will further increase capacity to some extent. The iron melt in their foundry is about twice what it was a year ago, but this is partially due to contracts for rough castings.

The Holthoff Machinery Company, Cudahy, Wis., say that they have no reason to anticipate anything but a continuance of the present activity, the number of inquiries being received daily indicating plenty of business in sight. From what they learn through their various customers in all parts of the country, mining interests are prospering and many improvements are being contemplated for the coming year. The company have enough orders booked to keep them in active operation for several months, and during April took \$100,000 worth of business. Their one difficulty is incapacity to take care of the business offered. They report that the demands for machinery come from all parts of the United States and from Mexico, South America and British Columbia. They have taken a large contract from the Pikes Peak Hydro-Electric Company for steel riveted pipe to be erected near Colorado Springs, for machinery from the Old Dominion Copper Company of Arizona, a combination mill, stamps and concentrating for the Wisconsin Mexico Mining Company of Sonora, Mexico, and a twin stamp mill for the Rosetta District Development Company, at Hailey, Idaho, besides several large orders for the building of air compressors and other machinery for local parties.

The Bignall & Keeler Mfg. Company, Edwardsville, Ill., state that they have enough orders in hand to insure working to the fullest capacity of their plant for at least four months, and have enough prospective orders to run for over a year. About a week ago the company quoted on 58 machines for a company in Pennsylvania that approximated \$60,000. There were 100 machines specified, but 58 were all that the company were enabled to quote on. They are ordering and receiving more castings at the present time than at any time heretofore.

The Stover Mfg. Company, Freeport, Ill., say that as

far as the volume of business is concerned, contrasted with a year ago, it is not so large, especially in the wind mill line. In hardware business is considerably better, and is very active even at the higher prices which were inaugurated after the first of the year. There is good reason, however, for trade not being as heavy in the wind mill line, as the season has been very wet, a condition which always influences business of this character. Foreign business has been much larger thus far than any previous year, and is constantly on the increase.

Machine Tools.

The B. F. Barnes Company, Rockford, Ill., report that business still continues to be unusually good, and while the aggregate amount of orders received during April was not quite as much as during March, it was still very much beyond their capacity. They are now from three to four months behind in the filling of orders, and there is no let up yet in sight. They think the prospect for the future is very promising, and believe that the latter half of the year will be up to, if not heavier than, the first half. They find it necessary to continually increase equipment by the installation of suitable machinery for the manufacture of their products. The company report the receipt of orders from all parts of the United States, more particularly the Eastern States, and are also receiving a splendid export trade. They have recently made heavy shipments to Germany, France and Austria, as well as to Belgium, Holland, Italy and Mexico.

McDowell, Stocker & Co., Chicago, state that their business has kept up remarkably well during the month which has just closed, although it has not been as large in volume as it was last month, which is owing, perhaps, to the considerable business taken during April, but which will not be billed until the early part of next month. Their orders, in large measure, are from established manufacturing concerns who are increasing their capacity. They have, however, sold several new equipments. They report the prospect very good for the future, and cannot see anything that would check the present business prosperity unless it should be the strikes that have been threatening. The company announce that by May 1 they expect to be located back in their store at 59-61 South Canal street, and will have on hand a complete line of new tools, larger and more varied than they carried previously.

The American Machinery Company, Grand Rapids, Mich., say that business holds up to their highest expectations, there being enough in sight to warrant running their factory to its fullest capacity night and day for some time in the future. They have recently placed three of their Oliver hand jointers and two additional Oliver saw benches with the Pennsylvania Railroad Company at their Altoona and Baltimore shops, besides a number of wood trimmers. They have also received orders for a saw bench for the Carnegie Steel Company's Sharon plant and for six wood trimmers for their Homestead plant; from the Standard Engineering Company, Ellwood City, Pa., for hand jointer and saw bench; from the Canadian General Electric Company for their Davenport (Ontario) plant a jointer and saw bench. Dealers in Boston, New York and Philadelphia are having a good trade in their products. The volume of sales, of course, is much larger in the iron and steel districts than elsewhere, as they are mostly used in these industries. The South begins to come to the front with an appreciation of up to date machinery, which a few years ago was entirely lacking, giving promise of a considerable trade there eventually. Railroad orders indicate special activity in that line and from every section of the country.

Hill, Clarke & Co., Chicago, say that business for the month of April has greatly increased as compared with that of April last year, and while the manufacturers do not see their way very far ahead, everything seems to be busy and the orders seem to be coming right along. While there is no special activity in any one line, aside from the automobile and gasoline engine business, they think the general outlook in this section of the country is very favorable. Smaller tools seem to be selling better than very large ones, and there is not much difficulty in placing stock orders for the standard makes.

The Aurora Tool Works, Aurora, Ind., report that they are well satisfied with the condition of business. Orders during April were nearly three times what they were during the same month of 1902, and fully double the average business at this season of the year since the advent of the present prosperity. The company have enough orders booked to keep their plant in full operation from three to four months. They have not increased capacity during the last two years, nor do they contemplate such changes.

The New Doty Mfg. Company, Janesville, Wis., say that the condition of business is as good as it has been, and the volume of inquiries would indicate that it would so continue for some time. They have orders on their books which will keep them busy for months. They have quite materially increased capacity during the past year, and have recently purchased land with a view of building a new foundry, as their foundry capacity is now overtaxed. They have orders

on their books at present going to all States in the country.

The George Whiting Company, Chicago, have recently had demands for machine tools beyond their capacity to supply, and they therefore decided to increase the capital stock to \$45,000, to provide additional working capacity and new equipment. They report sufficient orders on hand to keep their works in operation for several months. Prompt payments are being made on all machines sold. They announce the completion of five machines for the Worden-Allen Company's bridge and structural iron works, Milwaukee, Wis., and recently furnished three large punches for stock to McDowell, Stocker & Co., Chicago. Among recent sales have been the following: American Tower & Tank Company, Elgin, Ill., one double punch with one side arranged as structural punch and the other side to shear bars. Sackett Screen & Chute Company, Chicago, one double punch with one side arranged as a punch and the other side as a splitting shear. McAleenan Boiler Company, Peoria, Ill., one double punch with one side arranged as a punch and the other side as a splitting shear. Kroeschell Bros. Company, Chicago, one single belt power punch.

Tools and Supplies.

Joseph T. Ryerson & Son, Chicago, state that shipments of machinery now under contract are being made approximately as promised. The delays in the case of lighter tools are greater in number than in the heavier equipment. There seem to be as many large plants projected and figured upon now as this time last year, but there is a hesitation in the actual placing of orders. The business actually consummated is distributed along the entire range of metal working machinery. Hydraulic tools for railroads, boiler and bridge shops seem to be advancing in favor, and they anticipate a large business in that line. They do not believe that there is a serious tendency to delay improvements except in the case of the most recently contemplated projects. The Middle West seems to be the most active market for machinery at this time, and the congestion in the plants of machinery manufacturers in the past two years has resulted in inability to furnish special tools except at large premiums, so that the standard makes comprise the general bulk of the business now going forward.

The Whiting Foundry Equipment Company, Harvey, Ill., state that their business in 1903 has been considerably larger than in the same period a year ago, and is widely distributed. Chicago and immediate vicinity are buying a little freer than for some time in the past. Prospects are excellent for plenty of work the balance of the year, the only cloud being the possibility of general labor trouble.

The Chicago Pneumatic Tool Company, Chicago, say that in the pneumatic tool line the conditions are indicative of a continuation of prosperity for some time to come. The month of April closed with an unusually large amount of business transacted, showing about 50 per cent. increase over the corresponding month last year. They recently secured a large number of exclusive contracts from several of the leading railroads and manufacturing establishments for all the pneumatic equipment they may require for a certain period. The foreign branches report a correspondingly cheerful outlook abroad, and state that the only unusual feature which they have noted lately is in the increased number of complete plants which they are supplying—that is, installing entire air plants in establishments on the continent heretofore using the old hand methods only, indicating that American labor saving machinery is fast gaining a strong foothold in the old countries.

Chas. H. Besly & Co., Chicago, state that the business outlook in their line is very encouraging. The demand for the well-known specialties of their manufacture is larger than ever. They recently made shipments of Gardner grinders to California, Ohio, New York, Pennsylvania, Iowa, Michigan, Canada and Austria. They have just moved into their new store building, 15 to 21 Clinton street, which gives them double the floor space of their old quarters at 10 and 12 North Canal street. They note a decided saving of time in the filling of orders, owing to the convenient arrangement of stock in their new quarters.

The Fuller & Johnson Mfg. Company, Madison, Wis., say that trade with them during April was not quite up to that of the corresponding month of last year. They do not believe that the increased facilities which were added to manufacturing plants in their line a year ago will have enough business to keep them going to their full capacity. They do not think that as much iron and steel will be used during the last half of the year as for the corresponding period a year ago.

The Wilmarth & Morman Company, Grand Rapids, Mich., report a satisfactory month for the sale of their products. Among the orders booked during April are: Wet grinders to the C. & C. Electric Company, Garwood, N. J.; Tennessee Coal, Iron & Railway Company, Ensley, Ala.; Illinois Central shops, Centralia, Ill.; Charles Parker Company (2), Meriden, Conn. Dry grinders to the Stoughton Wagon Company, Stoughton, Wis.; Dayton Globe Iron Works (motor driven), Dayton, Ohio; Benj. Middleditch, Detroit, Mich.; Deane Bros. Steam Pump Works, Indianapolis, Ind.; Rock Island Railroad shops at East Moline, Ill.

(motor driven); Trenton, Mo., and Peoria, Ill.: Grey Iron Castings Company, Cincinnati, Ohio; Farrel Brake Company, Zanesville, Ohio; Cincinnati Car Company, Cincinnati, Ohio, and several machines for export and to machinery jobbers. The company anticipate a good business during May.

The Ransom Mfg. Company, Oshkosh, Wis., state that trade for April, 1903, was about 30 per cent. greater than during April last year. They have enough orders booked to keep them running two months. There seems to be a good, healthy demand, and they are looking forward to a better summer than last year.

The Chicago House Wrecking Company, Chicago, report that while the demand for second-hand tools and machinery compares very favorably with that of April a year ago, the orders are not coming in so freely as they might desire. The company, however, are satisfied that the outlook for the future is extremely encouraging, and that prospective business is only being retarded by temporary unfortunate conditions, especially the uncertainty of the labor situation. The necessity of more expansion of industrial plants is quite apparent, and it is only a question of days when that expansion will compel purchases in the machinery line.

McDowell, Stocker & Co., Chicago, announce that they will return early in May to their store at 59-61 South Canal street from which they were driven recently by fire. They will have on hand a complete line of new tools and a larger and more varied assortment will be carried than previously.

The Norton Emery Wheel Company now occupy all the floors at 25 South Canal street, Chicago, where they are making preparations to increase facilities for their improving trade.

The removal of the Chicago office of the Brown & Sharpe Mfg. Company from 23 South Canal street to 16-18 South Clinton street is announced. The company have erected a new and substantial building at the latter place, which affords them three times the amount of space they formerly occupied, and modernized equipment. F. A. Rich, the Chicago manager, reports business in good condition.

Boston Machinery Market.

BOSTON, MASS., May 3, 1903.

The Boston machinery dealers report that the month of April has been an exceedingly good one. When their February business was totalled grave uneasiness was felt because a decided falling off was shown, and the anticipation was that a period of depression was at hand. March, however, partly dispelled this foreboding, and then April came along and showed better business than the same 30 days of last year.

The outlook is bright in Boston. Inquiries are numerous and promising. Deliveries are a little easier, which is especially advantageous in New England, where buyers of tools will not brook long delay in delivery. There are no "glory orders" in the market. Few large buyers are in evidence. But the number of small orders, from established concerns, for a few tools to replace old tools or to extend a department here and there, are unusually numerous, and as there is always more profit in such orders the dealers are contented.

A rumor is persistently circulating in Boston that the manufacturers of machine tools are contemplating another advance in prices of 10 per cent., according to the report. The advance of 10 per cent. made six months or so ago by machine tool men of all lines did not affect business here. But it is feared by the machinery dealers that another advance would very seriously affect their trade. One of the largest dealers prophesied that another advance would cut business in two, but other dealers did not take so pessimistic a view of the possible situation. The rumor has it, and the dealers are disposed to believe it, that the National Association will formally take up the question of another advance at their next meeting. Inquiry among the manufacturers themselves elicits little information, excepting that the matter of another advance will undoubtedly be talked at the next meeting, but perhaps not actually in meeting but informally among the members. Opinions seem to differ as to whether the previous advance covered the additional cost of labor and materials entering into the manufacture of tools.

Of the dealers, Hill, Clarke & Co., express the brightest views of the situation. They were surprised at the information contained in the last week's New York machinery letter, that the month of April was somewhat of a disappointment to some machinery merchants. The Boston house is finding business exceedingly good, in fact, much better than for some time, so your representative was informed. Manning, Maxwell & Moore, the Prentiss Tool & Supply Company and the Niles-Bement-Pond Company expressed almost an equal satisfaction with present conditions.

The demand for hoisting machinery is very strong, in fact, too strong to make quick delivery possible. The shops are crowded with orders, the local agents say, which im-

pedes their business. Orders for pumping machinery are also brisk.

Business in the machine shops in the immediate vicinity of Boston does not appear to be as good as in the other machinery manufacturing centers of New England. Shops are running full, but there is something of a let up in orders, which is not true in some other New England cities, according to the reports made by the manufacturers. The labor troubles of trades other than the workers of iron and steel are somewhat felt.

The boilermakers in the eastern part of Massachusetts report business as considerably duller, and they are at a loss to know just why this is so, unless it may be laid to strikes, threatened and existing, in various lines of manufacture, which may have discouraged manufacturers from making improvements to their power plants. Up the State this is not the rule, the boiler manufacturers expressing themselves well satisfied with the business on their books.

The Edison Electric Illuminating Company of Boston have absorbed 11 of the suburban electric lighting and power companies, which places the company in control of fully one-half of the electric lighting and power business of Boston and the towns about the city within a radius of 10 miles. The companies taken in are the Dedham Electric Company, Blue Hill Electric Company, Milton Light & Power Company, Natick Gas & Electric Company, Framingham Electric Company, Greendale Chemical & Electric Lighting Company of Needham, Suburban Light & Power Company of Boston and the electric business of the Chelsea Gas Light Company, Newton & Watertown Gas Company, Woburn Light, Heat & Power Company and the Somerville Electric Company. President Charles L. Edgar of the Edison Company told your representative that the power stations at Woburn, Somerville, Chelsea and Newton will gradually be abolished during the next year or so, and the main power station of the company at South Boston will be increased. The purchasing departments of the 12 companies will be united. The stock of the absorbed companies will be canceled, and that of the Edison Company increased correspondingly, which will bring it up to between \$11,000,000 and \$12,000,000.

J. H. Houghton, New England, agent for the Lidgerwood Mfg. Company of Indianapolis and of the Atlas Engine works of New York, reports the demand for hoisting equipment to be brisk. During the past week he took orders for six 60 horse-power locomotive boilers mounted on wheels from the United States Government, for the engineers' department at Portland, Maine; a 50 horse-power, four drum Lidgerwood hoisting engine, for the Rowe Bros. Company of Richmond, Maine, for their new lighter; a 50 horse-power, three drum hoisting engine and a 30 horse-power swinging engine for John Cashman of Quincy, for a new lighter now building at East Boston, and a 50 horse-power boiler and Atlas engine for the Boston Molasses Company. Mr. Robinson has completed a contract for a plant, including tower, for William C. Atwater & Co. of Fall River, Mass. This contract included a double 15 x 24 inch, Lidgerwood direct acting, coal hoisting and trolley engine.

Announcement has been made that the Navy Department is to build one of the two steel training ships authorized by the last Congress at the Charlestown Navy Yard. As this will be the first vessel of any size built at the navy yard since the Civil War, the news was received with more than usual gratification. It is understood that much of the mechanical equipment, including auxiliary engines and electrical equipment, will be purchased in Boston. The ship will be full rigged, and will cost about \$370,000 outside of her armament.

The Norton Emery Wheel Company of Worcester is about to erect a large building to contain storage bins for raw material at their plant at Niagara Falls, N. Y., where they manufacture artificial corundum, which they have named "Alundum." Several new furnaces have recently been added to the plant, and a new building erected to increase the crushing room. The new material is proving a great success, being considered one of the best abrasives known.

The Pope-Robinson Company of Hyde Park, Mass., have added a line of steel castings to their business. The company manufacture the Robinson touring car, and in connection with that business have recently built and occupied a new foundry, where crucible steel castings are made from steel boiler punching stock. As the capacity of the foundry is considerably larger than the demands of the automobile business the company are making a feature of steel castings for the market.

The B. F. Sturtevant Company are already operating their new foundry at Hyde Park, and the big machine shops are now nearing completion, and will be occupied before the end of the season.

The Stewart Boiler Works of Worcester, Mass., are building a two-story addition to their works, 120 by about 68 feet on the ground. The first floor will be used for a small machine shop and for storage purposes. The upper floor will be an erecting shop, and in it will be installed a 20-ton elec-

tric traveling crane, to be furnished by the Niles-Bement-Pond Company. The arrangement of the building is such, with the contour of the land, that the crane will load onto and from the cars at one end of the building, and onto and from teams at the other end. This is a nonunion shop, and is not affected by the troubles which the boiler workers are making in some of the works of New England.

The Alaska Freezer Company of Winchendon, Mass., are contemplating building a new foundry. The company have recently completed an 84-foot addition to their factory, the new room being devoted to the galvanizing department for galvanizing hoop iron.

The wire rigging for the new cup defender "Reliance" was furnished by the Worcester works of the American Steel & Wire Company. The rope was subjected to unusually severe tests before delivery to the Herreshoffs.

The American Steel & Wire Company are to install four Buckeye engines at their Worcester works, to provide power for electrical motors, which will operate machinery situated at distances from power stations, to do away with expensive long lines of shafting. Three of the engines will be of 500 horse-power, and the other of 250 horse-power. Each will be directly connected to General Electric generators.

The New York, New Haven & Hartford Railroad are erecting a large power station at Hyde Park, Mass., to provide power for the new shops of the company in that place, and also, it is understood, to operate the suburban lines of the Boston & Providence division, in the neighborhood of Boston. It will be an easy matter to establish a third rail system of the suburban tracks.

The works of the Damon Safe & Iron Company, at Cambridge, Mass., were closed last week, the receiver having finished up all contracts which were on the company's books at the time of his appointment by the court last November. It is expected that an attempt will be made to reorganize the company, and continue the safe business which has been conducted for many years.

The Crest Mfg. Company, makers of automobiles, at Cambridge, are looking for a new plant. The company have grown to the limits of their present plant, with no possibility of further expansion on that site for lack of land to build upon. What they want is a shop building already erected, and of sufficient size to take care of future growth.

The machine shop buildings of the plant of the United Shoe Machinery Company, to be built at Beverly, Mass., will be four stories in height and 60 x 520 feet on the ground. They will lie parallel to one another, and connected by wings in which will be situated the lavatories, coat rooms, &c., and each having a 12-foot passage way. At the rear of these buildings will be another of similar construction, also four stories in height and 60 x 280 feet on the ground, this building to be used as a storehouse. Wings will connect it with the adjacent machine shop building. At the end of the storehouse and parallel to the machine shops will be the drop forging shop, 60 x 196 feet, and one-story high. This building will also contain the blacksmith shop. At the rear will be the power plant and foundry. The latter building will be 180 x 200 feet, and one-story high, the walls being almost entirely of glass to admit of plenty of light. The foundry will be equipped for both brass and iron work. The power house will be 75 x 100 feet. There will be a stockhouse for the foundry, 60 x 160 feet, and a stockhouse for wrought iron chips, the size of which has not been determined. The question of pattern storage has not been settled. There will be a chemical laboratory. The offices will be located in the end of one of the machine shop buildings. The machinery of the shops will be electrically driven in groups, but the size of the units has not been settled. Contractors are now figuring on plans.

Labor Matters.

Most of the trouble between the manufacturers of iron and steel products and the unions in the vicinity of Boston, with the exception of the molders in some parts of Eastern Massachusetts, have been settled. The most serious disagreement was among boiler manufacturers and in shipyards where kindred labor is employed. The boilermakers, riveters and other similar classes of workmen made demands for an advance of 10 per cent. in wages and for an eight-hour day for men engaged on repair and other outside work. A nine-hour schedule was already in effect. A conference was held between committees of the Boiler Manufacturers' Association and of the Boilermakers' and Iron Ship Builders' Union, when the matter was settled by a compromise. The demand for eight hours a day for men engaged upon repair and outside work was granted, and also an advance of 5 per cent. in wages. Two members of the association, the Roberts Iron Works Company and Edward Kendall & Sons, both of Cambridge, declined to be bound by the agreement. It is understood that Scannell & Wholey of Lowell will also refuse to grant the demands made by the local Boilermakers' Union. The machinists and blacksmiths made no demands.

Much of the trouble between the builders and manufacturers of structural iron and steel and the union of bridge and structural workers and hoisting and portable engineers has been dispelled by an agreement signed by most of the

concerns employing this class of labor. The demand was for 25 per cent. increase in wages, which means \$4 a day for structural workers and hoisting and portable engineers alike. This is the New York schedule of wages, and most of the employers yielded to the demand, signing an agreement to that effect. The Boston Steel & Iron Company and the New England Structural Company, both of whom employ non-union help, have signed no agreement.

Philadelphia Machinery Market.

PHILADELPHIA, PA., May 4, 1903.

Active conditions prevailed in the Philadelphia machinery market during April. Manufacturers, as a rule, have a good amount of business ahead, although in some instances not much actual new business was taken on. Some little irregularity was noticeable in the months sales. With some lines the volume of business was almost entirely transacted during the first half of the month, while in others that portion of the month was dull, and most of the orders booked were taken during the last half. With others again business was fairly distributed, and some record bookings were made. This irregularity has been attributed to the uncertain conditions of labor. Although this immediate territory has not been threatened with any general labor difficulties in the machinery and allied trades, there have been a number of minor grievances which, in most cases, have been satisfactorily arranged. Buyers therefore have been forced at times to postpone intended purchases, and in some cases where important extensions to plants have been contemplated the improvements have been deferred indefinitely.

The business of the month, on the whole, however, has been considered satisfactory, and while the total has not broken previous records, there is enough business to keep every one comfortably busy. Manufacturers of the larger machine tools, special machinery, engines, &c., have enough work on hand to keep their plants running at their best capacity for many months. Estimating departments are still being taxed to meet the demand for new machinery, equipments, &c., and if only a small part of the present volume of inquiries develop into orders, continuous activity for the entire year seems assured, and even for a long period after that, as some manufacturers have already booked orders for next year's delivery.

Shipments inside of six months on some classes of heavy work continue to be the exception rather than the rule, while on medium class work it is frequently impossible to do better than three months.

The delivery of raw materials has improved; pig iron, coal and coke can now be supplied promptly, and delays from that source are practically removed.

There has been no change in foreign demand; in some lines it has improved in others fallen off. Some new orders are to be noted from Great Britain and the Continent, but nothing to warrant the resumption of our former trade has yet made itself noticeable.

The demand for the medium machine tools, engines, &c., has been good; dealers floors keep fairly well stocked, but as some manufacturers have taken on much more business, gaps are probably not as promptly filled as they were a month or so ago. Some dealers report April as being a very good month, and many sales have been made for forward delivery.

Inquiry for the lighter machine tools, engines, boilers, &c., has been large, and the trade in this class of goods has been particularly satisfactory with deliveries unchanged. Machine shop supplies continue in good demand, deliveries being irregular, in accordance with the particular requirements.

The supply of both iron and steel castings and forgings is still unsatisfactory to the purchaser of these goods. Foundrymen have had continued extensive demands made upon them, and the difficulty heretofore of obtaining raw materials played an important part in deliveries. This feature should adjust itself somewhat, as almost all such materials are now in better supply.

Another condition now confronts the foundrymen; the demand made by the molders in a number of iron and steel foundries for increased wages, and its attendant delays will, unless an early adjustment of the matter is made, interfere with future deliveries of castings to a considerable extent.

Prices generally continue firm, and are being well main-

tained. In some cases premiums are being offered for early delivery, but manufacturers in most instances are booked so well ahead that it is almost impossible to make more than ordinary delivery.

The Eastern Steel Foundry Company, recently incorporated with a capital stock of \$1,800,000, will build a large steel casting plant at Eddystone, Pa. The estimated output of this plant will be 2800 tons of castings per month. A main foundry building, 250 x 550 feet, and a machine shop, 113 x 250 feet, are to be built as soon as possible. This is the new plant to which we referred in our last report, more complete details of which appear in another column of this issue.

The Philadelphia Rapid Transit Company will expend over \$100,000, it is said, for additions to car barns and power houses in the near future. Plans have been filed for two brick car barns—one 432 x 734 feet, the other 86 x 432 feet, at Frankford avenue and Bridge street, at an estimated cost of \$60,000; a brick power house, 105 x 128 feet, at Second and Wyoming avenues, at a cost of \$40,000; for an addition, 22 x 85 feet, to the power house at Thirty-third and Market streets, to cost \$10,000, and for alterations to the power house at Thirteenth and Mt. Vernon streets, to cost about \$4000.

George C. Deitrich has received the contract to build a boiler and engine house for the city of Philadelphia at Robinson street and Delaware avenue. The boiler house, two stories high, is 84 x 164 feet, with rear addition, 42 x 73 feet. The engine house will be one-story and basement, 90 x 173 feet. These buildings are part of the new Lardners Point Pumping Station, in connection with the Torresdale filtering plant, for the city water supply.

The Williamson Bros. Company have begun operations on a new foundry, supply and storage houses at Arimingo, Commerce and Cumberland streets. Two foundries—one measuring 53 x 210 feet, and the other 55 x 175 feet, are in course of erection. A two-story storage and supply house and two three-story storage houses are also to be erected.

The Espen-Lucas Machine Works continue busy. There is a good number of inquiries being received, and resultant orders are satisfactory. The demand for steel foundry and I-beam saws has notably increased, while a number of No. 2 horizontal floor boring, milling and drilling machines are nearing completion for Western parties. Several special No. 5 steel casting saws and No. 2 foundry saws, bar and I-beam saws have been delivered recently to various parties.

W. E. Shipley, representative of the Lodge & Shipley Machine Tool Company, advises us that trade during the past month has been particularly good, and that more orders are on the books than has been the case for a number of months. The demand for lathes has been exceptional, and a number have been sold and delivered to local and out of town parties. Reeves variable speed pulleys have also been in good demand, 15 having recently been sold to one party.

Thos. H. Dallett & Co. report an even run of business during the past month. Inquiries have been good and orders satisfactory. Demand for electric portable and rope driven drills has been particularly good, and a number have been delivered. Trade in pneumatic tools has been active, and many have been shipped during the current month.

The Philadelphia Pneumatic Tool Company find no diminution in the demand for their various pneumatic tools. Sales this year to date are largely in excess of the same period for 1902, and conditions are very favorable for a continued large trade. The increased trade included additional orders from England, Germany and Italy, and from the West and the Pacific Coast. Orders for chipping and riveting hammers have been received from the United States Government for the Brooklyn Navy Yard, and for chipper, riveters and drills for the Mare Island Navy Yard. Orders are also to be noted from the Lake Shore & Michigan Southern Railway, Westinghouse Air Brake Company and the American Car & Foundry Company. Shipment of Kellar tools are being regularly made, both for export and domestic use, a number of rammers being recently shipped to the Middle West for various large smelting works.

The Falkenau-Sinclair Company have booked a number of orders for their standard line of presses, &c., during the past month. Inquiries have been very good, and the prospects for continued activity are favorable. Some of the recent deliveries made by this company include a 100-ton vertical power testing machine of the standard type for Western Pennsylvania parties, a 100-ton hydraulic press has been delivered to local parties, a large double crank press has been shipped to New Jersey parties and a large spinning lathe has been forwarded to a Seattle, Wash., concern. The demand for their standard presses has been very good, and a number of these tools of various sizes have been shipped.

I. H. Johnson, Jr., Company, Incorporated, report a good condition of trade. Inquiries have been numerous, and there are prospects of some nice business being taken in the near future. All departments of the plant continue busy, and a large amount of work is in course of construction.

Recent shipments of lathes, include among others, one 54-inch, with 30-foot bed, for the Pittsburgh district; one 42-inch, with 26-foot bed, for parties in Alabama, and a number of smaller lathes for local and nearby parties. All these tools were of the regular standard Johnson type.

The American Pulley Company continue busy. The demand for all steel pulleys is good, particularly from the South and West. The foreign demand is also active, and a number of pulleys have recently been shipped to England and New Zealand. There is an excellent inquiry for various pressed steel shapes, and shipment of the latter class of goods as well as pulleys are being made to local and out of town parties.

The Link-Belt Engineering Company have recently received an order for a coal crushing, elevating and conveying plant for the Tidewater Steel Company, Chester, Pa. This equipment is to be used in connection with a coke by-product plant, and will have a capacity of handling 70 tons of fuel per hour. The Link-Belt Company have also received a large number of orders for general work, industrial conveying and conveyors for cement plants being the most noted. Trade in Southern territory has been so promising that it has been decided to open a Southern office, which has been located at Savannah, Ga. The demand for Renold Silent chain is also very good, and a large number of equipments have been made to tools, &c., for various parties.

The Energy Elevator Company continue very busy. The demand for elevators, both hand and power, has increased, and all departments of their plant are being operated to their best capacity. These parties have recently installed a hydraulic invalid lift for Wynnewood, Pa., parties, and an electric passenger elevator in the Rio Grande Hotel, Atlantic City, N. J. Freight lifts have been shipped to Newport, R. I.; Rome, Ga.; St. Louis, Mo.; Spillerville, Ark.; Arapahoe, Okla., and Salem, Ohio. Local installations have also been exceptionally numerous.

The Philadelphia Roll & Machine Company have completed the installation of their new power plant. Two new boilers, 100 and 125 horse-power respectively, have been placed, as have new compressors and a 150 horse-power engine. They will now add to their plant a new 15-ton air furnace and additional core ovens. On the completion of the improvements they will be able to make air furnace iron castings up to 50 tons weight in the single piece. The Philadelphia Roll & Machine Company keep busy in every department, orders for heavy and special charcoal iron castings being numerous. Rolls are constantly being shipped to various large steel and iron mills, while special castings are being delivered to various parties, both in and out of the city.

F. R. Phillips & Sons Company have completed the equipment of a six-mill tin plate train for the Juniata Steel & Tin Plate Company, Greencastle, Ind., and will shortly export to Scotland a large consignment of rolling mill machinery. A particularly good demand has developed for this class of machinery, both from domestic and foreign sources, and some nice contracts are in sight.

The Eynon-Evans Mfg. Company are actively engaged on the contemplated improvements previously noted in these columns. About \$26,500 will be spent by this company. The new power house is well under way, while additional improvements are to be made to the office, machine shop and foundry. A large amount of new equipment will be installed in these various departments, and facilities for the improvement of workmanship and deliveries added. All departments of their present plant are being operated at their best capacity, and deliveries of large and special patterns, steam jet blowers, condensers, castings and other goods are being regularly made.

The Tabor Mfg. Company, manufacturers of molding machines, have increased their capital stock from \$50,000 to \$100,000. The added interest will be used in the improvement of their plant and developing further lines of manufacture. Business continues exceptionally good with this company, and orders received during the past month have more than doubled the total for March. A large number of various molding machines have recently been shipped to various parties. Foreign demand is active, and shipment recently of a 16 x 32 inch split pattern molding machine to parties in Belgium is to be noted. In order to be better represented in Western territory, the Tabor Company have decided to open a Western office. J. W. Dopp will represent them in that territory, and will open offices in Chicago, Ill.

The Baldwin Locomotive Works continue busy. Every department is being operated to its fullest capacity in order to meet the demand for locomotives. The new tank shop is practically completed, and is now being occupied. This will aid the congested conditions in that and several other departments. The demand for locomotives continues very active, and a large amount of work is on the company's books. Some recent deliveries of locomotives include two heavy freight type engines for parties in China. These were bituminous coal burners of standard gauge. Shipments are also being regularly made to the Pennsylvania Railroad Company, Philadelphia & Reading, Southern Pacific and a number of other railroads and individual concerns.

HARDWARE.

THERE is a general recognition on the part of manufacturers and jobbers of the desirability of standing well in the estimation of the retail trade. The favor of these merchants, who are scattered over the length and breadth of the country as the distributors of the products made by the manufacturers and handled by the jobbers, is worth much in the marketing of any line of goods. This is especially the case where the goods have a distinctive character and are known as coming from a particular manufacturer whose reputation is concerned in their quality, and whose fortunes depend largely on the success which attends their sale. Even more directly does the good will of the retail merchant bear upon the jobbers' interests. Without their approval and good opinion any jobber would be seriously handicapped. Constant efforts are accordingly being put forth by both manufacturers and jobbers to stand well with the retail merchants, whose interests are considered in many ways, and to whom courtesies and attentions are freely and gracefully extended whenever opportunities present themselves. This is simply good business policy and happily in accord with the spirit of fraternity and the disposition to smooth the paths of the trade which is so characteristic at the present time.

For many years conferences between the manufacturers and the jobbing trade, especially in regard to the adjustment of prices and other matters connected with the marketing of goods, have been frequently held so as to secure harmonious relations and avoid irregularities and cross purposes as far as possible. Of late, however, there has been a further step in advance as these two great classes, represented on the one side by the SOUTHERN HARDWARE JOBBERS' ASSOCIATION and the NATIONAL HARDWARE ASSOCIATION, and on the other by the AMERICAN HARDWARE MANUFACTURERS' ASSOCIATION, have been meeting semiannually in separate conventions, but at the same time and place and also holding joint sessions for the consideration of matters of mutual interest. In this way there has been an opportunity for formal and official consideration of great questions, more important and of higher dignity than those concerned with single lines of goods, or for the purpose of determining discounts, making up classified lists or establishing differentials between the various grades of houses. Questions of general trade interest, rather than those concerning such details of business arrangement, have presented themselves for consideration at such gatherings, which will, it is hoped, more and more as the way opens, take up some of the graver questions and broader concerns of the trade.

There is no doubt that the question of catalogue houses and department stores is one of the most serious which confronts the trade. These methods of selling goods have already secured for themselves a prominent place in the market, but whatever advantages attend this change in old established methods there is no doubt that there is a serious disturbance of the regular course of things, opening new channels of distribution and causing more or less inconvenience and disappointment where the loss and disadvantage are most pronounced. Whatever may be the interests of the manufacturers in this matter there is no doubt that it is one of vital importance to the jobbing trade and naturally has received some attention from their representatives in conventions and conferences. It is, however, to the retail trade that the question comes nearest home, inas-

much as the local merchant finds his business cut into by this class of competitors, who are often offering goods such as he buys from jobber or manufacturer at prices which leave him little opportunity for profit. The retail trade, too, is in closest touch with the market and knows better than either manufacturers or jobbers what the facts are, the prices which prevail, the goods which are thus offered and the seriousness of this competition. Some of them, too, in their associations or individually have taken pains to ascertain something of the sources of supply through which these competitors of theirs obtain their goods, and are in a position to give information which should be of practical use to any who are endeavoring to restrict the mischief caused by such competition, or, if it must be recognized, to keep it within proper bounds and prevent it from resorting to practices which are antagonistic to the general interests of the trade.

Conferences in regard to trade matters obviously fail to be fully representative so long as the retail merchants are not represented in them. The question of catalogue houses and department stores is only one of those in which they have as direct an interest as either jobbers or manufacturers. There should be found some way in which the entire trade shall be brought together to discuss important questions in which all are concerned, with a view to reaching some understanding and pursuing, as far as the exigencies of business enterprise will permit, a course which will give proper recognition to the rights of all, with the adoption of policies which will tend to promote the general welfare. If the manufacturers and jobbers should take the retail trade thus into their councils there would be not only the advantage gained from having present representatives of the whole trade and not simply an important fraction of it, but an invitation coming from either the manufacturers or the jobbers, or both, to confer with them would tend to produce excellent feeling among the retail trade and to unite them in a more fraternal way to the other two great classes. It would certainly tend to disabuse the retail merchants of the impression which too much prevails that their interests are, to say the least, overlooked in such conferences. Until the past year or two there was no practical way in which the retail merchants could be represented for consultation with the jobbing trade or the manufacturers, but with the NATIONAL RETAIL HARDWARE DEALERS' ASSOCIATION, which is now thoroughly representative of retail interests, this difficulty is fortunately removed.

Condition of Trade.

Trade as interpreted by late advices from widely separated territory indicates an exceptionally substantial condition. This seems to be especially so in the South, which for years has gradually been improving its commercial position. It is significant that in Nashville bank clearings are reported as advanced 75 per cent. for April this year as contrasted with April, 1902. The record of collections from a Southern point is said to be as good in its way as the sales, March and April financial returns being the largest of any two months in the history of that house, while May opens in the same key, with no signs of falling off in the near future. Another report refers cheerfully to the farmer, in whose prosperity all are concerned, his condition being alluded to as much better now at a season's end than at the beginning, the reverse of which has sometimes been the case in the past. Naturally this induces new ventures on his part, with corresponding increased outlays for implements, &c. Some sections of the country are reported to

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be preparing for fall trade on a liberal scale, anxiety for prompt deliveries being more pronounced than any hesitancy in placing orders. Portions of the Pacific Coast record excellent trade conditions, with a future never more promising, although there is a discordant note from Portland, Ore., where strikes and lockouts are hampering trade and retarding building operations. From this point bank clearings are 33 1-3 per cent. less than the average for the three preceding weeks. Both jobbers and retailers as a whole appear to be fairly well stocked, and in some sections the periods of wet and unseasonable cold have served at least temporarily to check the volume of trade which the approach of more favorable meteorological conditions will doubtless correct.

Chicago.*(By Telegraph.)*

The first week in May has witnessed a further falling off in business in nearly all lines of Hardware. Most manufacturers, however, are still busy on orders booked some time since, and have orders in hand which will keep the mills and factories running more or less continuously full up to July 1. This is not uniform, however, especially as some of the independent Nail mills will be ready for new business about June 1. The falling off in trade at this time, however, is not of special significance, being the usual experience at this time of year, when farmers are busy preparing the soil for crops, seeding and planting. The cold weather the first few days of the month also is in a measure responsible, but the temperature is now more seasonable, and while a dull period is anticipated during the summer the prospects for fall are unusually bright. Dealers and jobbers are well stocked with staple goods and find some difficulty in forcing stocks into consumptive channels. This is especially true of the heavier lines, such as Sheets and Structural Material. There has been a fair merchant trade in Rivets, Bolts, Nuts, Washers, &c. Some manufacturers report sales of Bolts considerably in excess of output, and Washers are said to be obtained with difficulty, there being a scarcity in some sizes. Rivets have been in especially good demand, and assortments seem to be badly broken. There is scarcely an order received that it is possible to fill entirely, some sizes being lacking. This is more especially true of Structural Rivets; one large dealer reports sales during February, March and April as greater than ever before in a similar period. Builders' Hardware, especially the small trade, both city and country, is dull, but one or two large contracts have been placed and several others of this nature are pending. A Chicago manufacturer secured this week the contract for Builders' Hardware for the Oliver Building, at Pittsburgh, which aggregates about \$8000 in value. The contract for the Railway Exchange Building, Chicago, has also been placed, it is reported during the week, calling for an expenditure of about \$14,000. Bids are now being taken on the Wanamaker Building, at New York, and the First National Bank Building, at Cincinnati. There has been a revision of prices on Plated Butts, and in the adjustment some sizes appear to be about 10 per cent. lower. It should be noted, however, that it is a revision of the whole list and not a reduction of prices. Strap and T Hinges are unchanged; while business for the season has been quite liberal, trade at the moment is slow, local sales especially being small. Jobbers report difficulty in securing an ample supply of Wire Cloth, all sizes being scarce, but small sizes up to 20 inches are especially difficult to obtain, prices of the larger sizes have been advanced from \$1.15 to \$1.20, and in some cases even \$1.25 is asked, while in a few instances 20-inch has sold up to \$1.30, but this seems a little above the general level. Lawn Mowers have sold unusually well this season, and even now there is quite a good demand and difficulty in obtaining shipments. Ice Cream Freezers are in more liberal supply and prompt shipments are made; trade in Axes is still dragging, with some irregularity in prices reported. There is a moderate demand for the better grades of Shovels from railroads, and also for Wheelbarrows, but the demand is largely for the lower grades of Shovels, which manufacturers are not shipping promptly, accord-

ing to reports in this market. The demand for Garden Wheelbarrows is especially active.

St. Louis.*(By Telegraph.)*

Although the season is pretty well advanced, trade conditions have, from the jobbers' standpoint, continued very satisfactory. The volume of business is large, and in most cases in advance of that a year ago. The festivities of the past week attending the dedication of the World's Fair have been more or less of a hindrance to the trade, but it is hardly likely to have more than a transitory effect. It is hard to say just now how severe the losses will be on account of the frosty weather which visited a large range of territory. Undoubtedly some varieties of fruit as well as some of the staples were injured.

Cleveland.

THE W. BINGHAM COMPANY.—The demand on the Cleveland jobbers for all kinds of Mining, Milling and Manufacturing Supplies in the Hardware line is very large at present, and orders are coming to us from all sections of the country. There is an immense tonnage of all kinds of commodities coming to and going out of Cleveland at the present time, and in the past year, as per statistics, an immense amount of freight has been handled in this city. The Chamber of Commerce statistics show that shipments of freight received in Cleveland for the past year amounted to 16,262,471 tons, and that there was forwarded from Cleveland 10,852,325 tons. Any one with half an eye can see at a glance that a large amount of labor and large facilities are required to distribute this large tonnage.

Cleveland is so favorably situated that it is one of the best distributing points in the country, both by rail and by water, and merchants in all sections appreciate these facilities and are sending their orders to Cleveland jobbers and manufacturers for their supplies in a very large volume. Our jobbers being very well supplied with what are called seasonable goods—viz.: Lawn Mowers, Netting, Wire Cloth, Step Ladders, Shovels and Spades, Steel Goods, and a general assortment of House Furnishing Goods and the like—are just now receiving many duplicate orders for these goods.

The spring season is opening up in fine shape, the warm sun and rain make the city gardener and country farmer feel that he must replenish his stock of Tools and supplies. The large trade that comes to Cleveland from dealers who supply farmers and housekeepers and home builders, in addition to the large demand in the mining and milling supply lines, makes in the aggregate a very large business and keeps us all busy.

If supply and demand are any criterion as to what prices of goods should be, it is very evident that many lines of goods are handled too close. It is said that "Competition is the life of trade," and certainly it is not only this, but in the last year has been a great leveler of profits. However, trade, on the whole, in this section is quite satisfactory.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—The volume of business transacted during the month of April was simply wonderful. It was beyond all past records and exceeded the most sanguine expectations. As a rule Southern Hardware jobbers begin to see business falling off just a little during the month of April (many of the Southern houses begin taking stock during that month), but this year things have been very different. From the first day to the last day of April business has been unusually heavy. Salesmen on the road have sent in large orders and lots of them. Mail orders, telephone and telegraph orders have simply flooded the wholesalers. Prices are being well maintained, and the market is in a firm and most satisfactory condition. The movement of summer goods has been particularly large, including Refrigerators, Freezers, Coolers, Lawn Mowers, Wire Cloth, Fencing, Poultry Netting and Saddlery Goods.

These good times do not seem to be confined to the Hardware jobbers alone, as all branches of trade in this city report similar conditions. The bank clearings

for the city of Nashville during the month of April showed an increase of 75 per cent. over April of last year.

Collections have been equally as good as the sales, our collections for the months of March and April being the largest for any two months in the history of this company. May is starting out in about the same manner, and we can see no signs of a let up in the near future.

Louisville.

W. B. BELKNAP & Co.—The market for all commodities seems to be in a most healthy condition. The farmer is certainly getting a good price for whatever he brings to town and his acre of land looks doubly valuable to him as he contemplates its possibilities for the coming crop. In other words, his labor is not thrown away, but bears a handsome premium. He is a long way better off at the end of the season than he was at the beginning and that lends encouragement for new enterprises on his part, and the purchasing of new Tools and Implements.

Money is active and bringing fair rates; at the same time not scarce for any legitimate enterprise. The showing of the banks must be satisfactory to their officers and stockholders. Preparations are being made on a liberal scale for fall trade. There is no hesitation about buying. The main anxiety seems to be to secure stated deliveries.

Altogether we are optimistic on the outlook and do not believe that the war clouds in the Balkans or on the borders of Manchuria have any very heavy hall stones for the United States, and when it begins to rain we believe that our people may know how to come in out of the wet, or are so well provided with gum coats and tarpaulins that they are able to stand it a little better than the rest of mankind.

There is apt to be something of a lull in heavy goods for May and June. This is almost inevitable, but the volume of seasonable specialties we do not believe will be disappointing.

Baltimore.

CARLIN & FULTON.—The spring season having well advanced, business is shaping itself toward those lines of goods more particularly demanded for the summer season and a few days of warm weather will increase the demand very greatly for Agricultural Implements, such as Scythes, Snaths, Lawn Mowers, &c., as well as for Refrigerators, Freezers, &c.

The uncertainty attending labor conditions is causing building operations to be conducted with great care on the part of contractors, but it is hoped that the differences will not be of long duration.

There is but little to mention in regard to prices. Axes have been very unsettled, but with the present prices for Steel and for labor it would seem a suicidal policy for the manufacturers to conduct their business much longer with a lack of profit, if not with an absolute loss on some brands which have been offered.

We think trade is generally in a good condition from all reports, and while there may be the usual lull for the next few weeks, it will start up again with its usual activity after July 1.

San Francisco.

PACIFIC HARDWARE & STEEL COMPANY.—It is very gratifying to be able not only to repeat the good reports that have been coming from this section of the country, but to enlarge upon them with the statement that the future never promised better than at the present time. This future includes not only the prospects for the current year, but we have every reason to hope that each succeeding year will see us in more flourishing condition.

The reports of important improvements are of daily occurrence, and the extreme activity of building operations in our own city leads us, perhaps, to overestimate the growth of population. There is also a growing feeling among the better class of our merchants that in order to prosper themselves they must help to make their neighbors prosperous. This is inducing many of them to patronize the jobbing centers close at hand with an ever increasing liberality.

Certainly the Hardware business is good at present, but then this is one of our busy seasons and the volume of sales is nothing more than the general conditions have led us to expect. We shall be much disappointed if trade does not continue to improve for months to come, if not for years.

Portland, Oregon.

CORBETT, * FAILING & ROBERTSON.—Lumber, lumber, lumber everywhere and none to sell, is the slogan of the saw mills. Portland mills are running day and night, cutting 1,500,000 feet of lumber every 24 hours, and still contractors cannot buy and building operations are at a standstill.

This condition is brought about by the saw mills practically inaugurating a lockout in support of master painters in the strike that has been on since April 1 in that trade. It looks as though Portland manufacturers and employers of lumber in general were bound together to break the unions if possible, in support of the drastic measures advocated by Mr. Parry at the Manufacturers' Association meeting in New Orleans.

Clearings last week were about 33 1-3 per cent. less than the average of the three preceding weeks, and the present week will probably show a still greater slump.

Why strikes and lockout are not inaugurated and conducted in dull times, when no one is making money, instead of in times like the present, when enough men and mechanics can hardly be found to do the work offering, can only be accounted for on the theory that employers become so puffed up and bloated by success and prosperity that they court the means that leads to their own and their employees' undoing.

Trade, of course, is not as good as heretofore reported and the prospect is that it may be worse, rather than better, in the near future.

Philadelphia.

SUPPLEE HARDWARE COMPANY.—Business in trade circles appear to be of satisfactory volume and variety, notwithstanding an anticipated setback to trade caused by the rainy weather of some two weeks and the sudden cold which remained some days, but which appears not to have affected general orders from salesmen, although perhaps fewer mail orders have been received during this period. General trade does not appear to have been affected.

Orders for season goods placed at an early date, for shipment May 1, are being called for and prompt shipment requested by retail merchants.

In Agricultural Implements Philadelphia has suffered temporarily through the misfortune of two old and long established firms being bought out by the "trust combination," no combination of this nature having so fully merited marks of disapproval as shown by the results of this absorption. The concerns were old established firms of good reputation, knew the wants of the trade and were accustomed to filling orders promptly. The capacity for supplying all goods of the retiring manufacturers, as well as those of the concerns that remain, it was expected could be furnished by the remaining manufacturers. But we are hampered with all sorts of excuses—the impossibility of getting Steel, the impossibility of getting Handles, and so on and so forth—the trade getting excuses in place of goods. Answers to demands must wait the roundabout way of being referred to authorities at a distance, answers coming from the distant headquarters.

The fear of strikes in manufacturing establishments surrounding our city stares us in the face. It is supposed that May 4 a large number of workmen in various trade organizations will go out on strike. How far this will extend is at this writing quite uncertain. The demand for higher wages if granted will certainly extend through additional trades; if not granted sympathetic strikes may occur.

There is every indication of a good demand for goods if not interrupted by strike conditions.

St. Paul.

FARWELL, OZMUN, KIRK & Co.—Trade conditions continue favorable. April weather was cool and wet and trade was held back somewhat, but was still equal to that

last year for the same period. Prospects for May are excellent. The main part of seeding wheat, oats and barley is finished.

NOTES ON PRICES.

Wire Nails.—New business has diminished somewhat in volume, but mills are steadily employed on contract orders. It is expected that the works which have recently started making Billets will have the effect of relieving the scarcity of Steel to some extent. Delays in transportation of Nails have not altogether disappeared. The tone of the market is firm. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots.....	\$2.00
Retailers, carload lots.....	2.05
Retailers, less than carload lots.....	2.15

New York.—At this point the amount of business for the month of March exceeded that of April. Strikes in territory tributary to this city have not effected the demand to the extent that it was anticipated they would. While orders are smaller they are frequent, and in some cases urgent for prompt delivery, being confined to immediate requirements. The market is firm and prices are adhered to. Quotations are closely adhered to and are as follows: Single carloads, \$2.20; small lots from store, \$2.25 to \$2.30.

Chicago, by Telegraph.—The conditions reported a week ago continue to be the prominent features. Most of the mills are busy on old contracts, and while there has been a further falling off in new business, there has been a fair number of new orders. The stringency in Steel Billets has been somewhat relieved, but there is still a scarcity of Rods and Billets. Shipments are more satisfactory. The jobbing trade has been less active, but fair for this season, and the market has remained firm. Official prices are \$2.15 to \$2.20 in carload lots, f.o.b. Chicago. Broken cars sell at 5 to 10 cents higher. For galvanizing 75 cents per keg and for tinning \$1.50 extra per keg is charged.

St. Louis, by Telegraph.—The jobbing trade report a continuance of satisfactory business for Wire Nails and the quotation is unchanged, holding at \$2.35 in small lots from store.

Pittsburgh.—Demand for Wire Nails continues satisfactory considering the season, the rush being over. Prices are firmly held and we quote Wire Nails \$2 in carloads to jobbers, \$2.05 in carloads to retailers and \$2.15 in small lots, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days; for galvanizing Nails 75 cents per keg is charged and for tinning Nails \$1.50 per keg extra.

Cut Nails.—Not all the mills in the country are kept in operation nor all the machines employed in such mills as are running. The output has been gauged to the requirements of the trade, which vary little from year to year. While mills are temporarily somewhat slow about making shipments, owing to the large contracts placed previous to the recent advance in prices and to the scarcity of Steel, they do not feel justified in accumulating stock by putting additional machines to work at this season. The market is strong and quotations are as follows: \$2.15, base, in carloads, and \$2.20 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms 60 days, less 2 per cent. off in 10 days.

New York.—The demand continues steady and in moderate proportions. Labor troubles have not reduced the volume to the extent that it was thought it might. The market continues firm, and quotations for carloads and less than carloads are as follows:

Carloads on dock.....	\$2.20
Less than carloads on dock.....	2.33
Small lots from store.....	2.40

Chicago, by Telegraph.—There has been some little increase in the supply of Steel, but the mills still find considerable difficulty in making prompt shipments. Manufacturers are busy on specifications received on account of old contracts, but there is less new business coming forward. The tone of the market is firm, without

change in prices previously current, which are on the basis of \$2.30 in carload lots and \$2.35 in less than carload lots for Steel, Chicago. Iron Nails are held at \$2.45 to \$2.50 per keg from store.

St. Louis, by Telegraph.—Demand continues in very fair volume. Jobbers quote Steel at \$2.40 and Iron at \$2.55.

Pittsburgh.—Cut Nails are scarce, especially Iron Cut, and the tone of the market is very firm. We quote: Steel Cut Nails, \$2.15, base, in carloads and \$2.20 in less than carloads; Iron Cut Nails, \$2.25, base, in carloads and \$2.30 in less than carloads, plus freight in Tube Rate Book to point of destination, 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The falling off of the volume and number of new orders has permitted more prompt deliveries, as the mills are beginning to catch up on contract orders. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.30	\$2.60
Retailers, carload lots.....	2.35	2.65
Retailers, less than carload lots.....	2.45	2.75

Chicago, by Telegraph.—The new orders coming forward have been for small amounts and the aggregate tonnage has not been large, but the mills are still busy on old contracts, specifications being received to a liberal amount. The jobbing trade has shown some falling off, but the tone of the market has continued firm. Galvanized Wire has been sold on the basis of \$2.75 to \$2.80 in carload lots, and Painted at \$2.45 to \$2.50, the outside price being to retailers. For small lots 5 to 10 cents extra is charged. Staples in carload lots sell as follows: Polished, \$2.30 to \$2.35, and Galvanized \$2.70 to \$2.75, the outside price being to retailers.

St. Louis, by Telegraph.—The demand for Barb Wire continues quite liberal and jobbers' quotations are unchanged: Painted, \$2.60, and Galvanized \$2.90.

Pittsburgh.—Trade is moving along smoothly and there is little trouble about deliveries. The big business has all been done, but specifications are excellent. Prices are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days: Painted, \$2.30; Galvanized, \$2.60, in carloads to jobbers; Painted, \$2.35; Galvanized, \$2.65, in carloads to retailers; Painted, \$2.45; Galvanized, \$2.75, in small lots to retailers.

Smooth Fence Wire.—New business is large and specifications on contracts are being received in satisfactory volume, keeping mills busily employed. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.90
Retailers, carloads.....	1.95
Less than carloads.....	2.05

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

6 to 9	10	11	12	12½	13	14	15	16	
Base.	\$0.05	.10	.15	.25	.35	.45	.55	Annealed.	
	\$0.30	.35	.40	.45	.55	.65	1.05	1.15	Galvanized.

Chicago, by Telegraph.—The volume of business in Smooth Wire and Fencing has continued liberal, specifications on old business being re-enforced by a considerable volume of new orders. A scarcity of Nos. 14 and 16 Galvanized is reported, and it is claimed that a premium could be obtained for these sizes if available. The jobbing trade has been equally good and the market has remained firm. The following are the prices current: Nos. 6 to 9 on the basis of \$2.05 to \$2.10 in carload lots on track and \$2.15 to \$2.20 in less than carload lots from store, Galvanized bringing 30 cents extra for Nos. 6 to 14, and 60 cents extra for Nos. 15 and 16.

St. Louis, by Telegraph.—In touch with other departments of the market for Wire products, Smooth Fence Wire is in very steady and fairly liberal call. Quotations are as follows, in small lots from store: No. 9, \$2.30, and Galvanized, \$2.60.

Pittsburgh.—Specifications are good on old contracts, and there is nothing of special interest in the market. Prices remain as follows: Plain Wire, \$1.90, base, for

Nos. 6 to 9 in carloads to jobbers, \$1.95 in carloads to retailers and \$2.05 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

Pumps.—About 15 manufacturers of Iron Pumps held a meeting at the Auditorium Annex Hotel, Chicago, on April 28. Trade subjects were considered in executive session and the feasibility of reorganizing the National Association of Iron Pump Manufacturers was discussed.

Shot.—A reduction in the price of Shot is announced under date of the 4th inst. Present quotations are as follows, terms net 30 days, or 2 per cent. discount for cash in 10 days, the usual abatement being given in ton lots:

	25-lb. bag.
Drop Shot up to B.....	\$1.40
Drop Shot, B and larger.....	1.65
Buck Shot	1.65
Chilled Shot	1.65
Dust Shot	2.00

Conductor Pipe, Eave Trough, &c.—The following are the advanced prices on Galvanized Conductor Pipe, Eave Trough, &c., referred to in our last issue and which went into effect 23d ult. The discounts for the various territories are as follows, terms 60 days, or 2 per cent. discount for cash in 10 days from time of shipment.

Eastern Territory.

Conductor Pipe, nested.....	70 and 12½ %
Conductor Pipe, not nested.....	70 and 7½ %
Eave Trough.....	75 and 16 2-3 %

Central Territory.

Conductor Pipe, nested.....	70 and 7½ %
Conductor Pipe, not nested.....	70 %
Eave Trough.....	75 and 12½ %

Southern Territory.

Conductor Pipe, nested.....	65 and 10 %
Conductor Pipe, not nested.....	65 and 5 %
Eave Trough.....	75 and 2½ %

Southwestern Territory.

Conductor Pipe, nested.....	65 and 7½ %
Conductor Pipe, not nested.....	65 and 2½ %
Eave Trough.....	75 %

Nebraska, Kansas, Oklahoma and Indian Territory take the Central Territory discounts, but with freight allowed only to the Missouri River. The territory lying west of these lines takes the nearest territory discounts, freight to boundary line allowed. Cities on boundary lines take discounts ruling in territory receiving the lower prices. The following are the discounts on Elbows and Shoes, &c.:

Elbows and Shoes.....	60 %
Miters, End Pieces and Drops.....	25 %
Steel Hangers.....	20 %
Wire Hangers.....	30 %
Cut-offs	70 %

Cordage.—No change has taken place in the condition of the Rope market during the week. Demand keeps up to expectation. Quotations are as follows, on the basis of 7-16-inch and larger: Sisal, according to quality, 8½ to 10 cents; Manila, on the same basis, 11½ cents per pound.

Glass.—At the present time the market is considered in an unsatisfactory condition by many of the jobbers. There is little demand and reports are to the effect that some of the factories outside of the combine are offering Glass at lower than market quotations. There is also uncertainty regarding the condition that the market will assume in the fall, and whether the Glass blowing machines will be used. It is expected that a meeting of the representatives of the American Window Glass Company and the Jobbers' Association will be held during the present month to clear up some of these uncertainties.

Binder Twine.—About two weeks ago the International Harvester Company temporarily withdrew from the market. Last week one of the largest Twine producing mills in the West was closed on account of a strike. Producers outside of the combined companies have quite generally advanced prices for Sisal and Standard Twine, while other grades have not been affected. A number of the Eastern and outside Western manufacturers have also withdrawn from the market and but little Twine is being offered, so that in the absence of business it is difficult to determine what prices rule. In the

West there has been a feeling that the combined companies will make no changes in prices when they again offer Twine for sale. The following may serve as a guide regarding possible quotations, f.o.b. Eastern mills, with ¼ cent per pound rebate in carload lots:

Sisal	10¼c. to 11¼c.
Standard	10¼c. to 11¼c.
Standard Manila (550 feet).....	11c.
Manila (600 feet).....	11¾c.
Pure Manila (650 feet).....	12¾c.

Oils.—The Linseed Oil market remains quiet, with a limited demand confined to present consumption. Orders for future delivery are neglected and no pressure is brought to bear by the crushers to increase the volume of trade by quoting lower prices. City Raw is quoted at 44 cents per gallon in lots of five barrels or more, and out of town Raw at 41 cents in like quantities. An advance in the prices of Black and Cylinder Lubricating Oils, from 1 to 1½ cents per gallon has taken place during the week. The advance is attributed to a heavy increase in the demand for these goods.

Spirits, Turpentine.—The high prices which have ruled for some months have unfavorably affected both domestic and foreign demand. Recent lower values have stimulated trade to some extent at this point and have reduced stocks. The scarcity during the past two days has strengthened the market to some extent. Quotations, according to quantity, are as follows: Southern, 49½ to 50 cents; machine made barrels, 50 to 50½ cents per gallon.

CHICAGO RETAIL HARDWARE DEALERS' ASSOCIATION.

MEMBERS of the Chicago Retail Hardware Dealers' Association were entertained by the Reading Hardware Company, P. & F. Corbin, Allerton-Clarke Company and the Brand Stove Company, on Thursday evening, April 30. There was a bowling contest, but the scores were lost sight of during the subsequent interesting proceedings. W. H. Bennett of the Reading Hardware Company reports that his side won the honors.

It is early to be preparing for picnics, but business life has been so strenuous with the Chicago Retail Hardware Dealers recently that many look forward with pleasurable anticipation to the forthcoming annual picnic of the association, which will be held some time in July. Martin Engelhardt, Hans Fehr, Fred. Ruhling, Chas. Dalstrom and E. H. Schanze, the committee appointed to select the picnic grounds, have decided on Northwestern Park, 17 miles from Chicago, on the Northwestern Railroad.

At a recent meeting of the association a resolution was unanimously adopted thanking H. H. Roberts, manager of the Chicago office of *The Iron Age* for his efficient services as toastmaster at the banquet tendered by the Chicago Association to the delegates from the various States to the convention of the National Retail Hardware Dealers' Association, held in Chicago in March.

THE SARATOGA CONVENTIONS.

THE SOUTHERN HARDWARE JOBBERS' ASSOCIATION and the American Hardware Manufacturers' Association, who meet in Saratoga July 14, 15, 16 and 17, will make their headquarters at the Grand Union and Congress Hall. We understand that there is reason to anticipate a good attendance of the members of the jobbers' association, while the indications point to an exceptionally large gathering of the manufacturers.

THE M'INTOSH HARDWARE CORPORATION.

THE MCINTOSH-HUNTINGTON COMPANY, Cleveland, Ohio, have been succeeded by the McIntosh Hardware Corporation, who, with largely increased capital, will continue the business of the old company. The latter had for some time felt that the charter under which they were operating was not sufficiently broad in its scope for their business. They therefore concluded to

organize under the laws of Connecticut, at the same time increasing their capital. The McIntosh Hardware Corporation is the result of this action, and it is expected that the business will largely increase under the new style. No change whatever has taken place in the management or officers, who continue as follows: George T. McIntosh, president; F. P. Smith, vice-president; H. H. Bishop, secretary, and A. C. Hord, treasurer.

POPE MFG. COMPANY.

THE new company known as the Pope Mfg. Company, recently incorporated to take over the properties of the late American Bicycle Company and allied interests, such as the Federal Mfg. Company and the International Motor Company (neither of which went into a receiver's hands and both of which are on a sound basis and paying properties), have filed with the Secretary of State of New Jersey, under date of May 1, amended articles of incorporation, increasing their capital stock to \$22,500,000. At the proper time, as the plan which has been adopted matures and develops, officers will be chosen and a call made for payments on the stock subscribed for, which will put the company in funds for taking over the various properties they have sought to absorb. The capital is divided into \$2,500,000 first preferred stock, with 6 per cent. cumulative dividends; \$10,000,000 second preferred stock, with 5 per cent. dividends, which will become cumulative after February 1, 1905, and \$10,000,000 common stock.

EASTERN GRANITE ROOFING COMPANY.

THE EASTERN GRANITE ROOFING COMPANY, feeling the need of enlarged office facilities, have taken the entire tenth floor of the fine new Irving Building, just completed, at the corner of Chambers street and West Broadway, just opposite their late quarters in the Gerken Building. This company are large manufacturers of what in trade parlance is known as Perfected Granite Roofing. It consists of two and three ply asphalt prepared felt, the layers of which are cemented together with an asphalt composition and the outer surface similarly covered, to which is added a coating, while hot, of fine screened sea grit or gravel. This makes a roof suitable for any climate, hot or cold, and any pitch of roof, steep or flat. It is also said to be fire proof.

THE SCHWABACHER HARDWARE COMPANY'S CATALOGUE.

THE SCHWABACHER HARDWARE COMPANY, Seattle, Wash., have just issued a 1269-page catalogue, about 9 x 12 inches in size, substantially bound in cloth and leather, comprising complete lines of goods carried in stock by them. The company state, with pardonable pride, that the catalogue is a thoroughly Seattle production. The book was compiled in their store by Frank G. Batchelor, while the paper used was manufactured by a local company and the printing and binding was done by a Seattle concern. Most of the cuts used in producing the book were loaned by the different manufacturers, and this is the only assistance the company received outside of their employees.

A full page view is given of the store fronts on First avenue and Yesler Way, which is followed by an alphabetically arranged index of 70 pages. The lines of goods carried are varied, as indicated by the department index, as follows:

- Mechanics' Tools.
- Lumbering Tools.
- Farming Tools.
- Locks and Builders' Hardware.
- Miscellaneous Hardware.
- Ship Chandlery and Marine Hardware.
- Iron and Steel, Pipe and Fittings, Valves, &c.
- Housefurnishing Goods.
- Cutlery and Plated Ware.
- Guns, Sportsmen's Supplies, Fishing Tackle.

The catalogue is well printed on a good quality paper, fully illustrated, comprehensively arranged, with information given regarding the goods as minutely as space permits. The company are to be congratulated upon their success in putting out such a work, which will without doubt be highly appreciated by their customers.

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TRADE ITEMS.

BAKER-VAWTER COMPANY, Chicago, Ill., on May 1 moved their offices in that city from the Chamber of Commerce to larger quarters in the sixteenth floor of the Tribune Building, at Madison and Dearborn streets. This concern are accountants, auditors and devisers of business systems, manufacturing their own material, and have a New York office at 320 Broadway.

JOHN H. GRAHAM & Co., 113 Chambers street, New York, have recently taken over the marketing of the entire product of Taintor Positive Saw Sets, made by the Taintor Mfg. Company, New York, for whom they are direct representatives. A good stock of goods will be carried at the above address, enabling them to execute all orders without delay.

J. H. COOK, who for over 20 years has been connected, directly or indirectly, with the L. S. Starrett Company, Athol, Mass., in the sales department, has resigned to accept a similar position with the Sawyer Tool Mfg. Company, of Fitchburg, Mass. In addition to Mr. Cook's ability as a salesman he is referred to as having had much to do with the development of a number of fine Tools which are on the market to-day.

THE WESTERN STEEL & WIRE COMPANY, Kansas City, Kan., have recently purchased the patents, property and business of the New Century Hay Press Company. The Hay Press equipment has been moved to the new plant of the Western Steel & Wire Company in Armourdale, where the Press will be manufactured on a large scale.

EDWARD F. KEATING, 452 and 454 Water street, New York, have been appointed agents for the sale of the A. B. C. Tee Bolt, manufactured by A. B. Carll, Boothwyn, Pa., which was illustrated in our issue of March 19 last. This device is intended for suspending a pipe hanger of any kind from a hollow brick or Wire Lathed ceiling. It can also be used wherever a Tee Bolt is needed for fastening anything to a hollow wall or ceiling.

CARTER, RICE & Co., Boston, Mass., manufacturers of Trimmings and Supplies for picture makers, sold usually by stationers, have moved their New York office, in charge of J. A. DeCamp, from 90 Chambers street to 23 Warren street.

COE MFG. COMPANY, 50 Warren street, New York, manufacturers of Metal Novelties, Bicycle Accessories and Kindred goods, have arranged with the makers of the Quick-as-a-Wink Cork Puller to market them with the jobbing trade in the United States, except in New York and Pennsylvania. This puller consists of two pointed flat steel springs opposite each other, secured in a wooden handle, which instantaneously removes the cork without any injury whatever by introducing the two thin strips of spring steel between the outer side of cork and inner side of neck of bottle, when a twist withdraws the cork. The cork can be quickly reinserted by reversing the movement. They are also handling the Gem Finger Nail Clipper among the jobbers of Cutlery, Hardware and Druggists' Sundries.

THE SCOVILL MFG. COMPANY, Waterbury, Conn., have bought at public auction the property of the Matthews & Willard Mfg. Company, of that city. The sale included all the assets of the company, excepting a cash balance of \$1200. The Scovill Company paid \$157,000 for a property inventoried at \$212,864. They were the principal creditors of the Matthews & Willard corporation. It was the opposition of certain stockholders of the company to the recommendation of the directors that the business be sold to the Scovill Company that resulted in the receivership. The Matthews & Willard plant, where Brass goods are manufactured, started up again last week, and it is understood that new life and capital will be infused into the concern.

THE ANGLE STEEL SLED COMPANY, Kalamazoo, Mich., are about to build a factory with wood frame, steel cover, gravel roof, 48 x 300 feet in size, two stories high, on the line of the South Haven Branch of the Michigan Central Railroad. The shops will be equipped with the latest improved machinery, and when in full running

order will have a capacity of 200,000 to 250,000 Coasting Sleds per year. The company are also gradually working into Steel Furniture Specialties.

THE CORBIN SCREW CORPORATION.

THERE was a meeting of the directors of the American Hardware Corporation, and also of Russell & Erwin Mfg. Company and P. & F. Corbin, held at New Britain on the 2d inst. to take action in reference to the organization of the Corbin Screw Corporation. The new company take over the Screw business of the American Hardware Corporation, which is now conducted by P. & F. Corbin and Russell & Erwin Mfg. Company separately. Russell & Erwin Mfg. Company have two factories, one in this city and one at Dayton, Ohio, and both of these factories now become the property of the Corbin Screw Corporation. The three factories employ at the present time about 1500 hands, and 400 of these are at Dayton, Ohio, the remainder about equally divided between the two departments at New Britain. It is the intention of the management of the Corbin Screw Corporation to gradually consolidate the two plants at New Britain on property now owned by Russell & Erwin Mfg. Company, as this movement will save a considerable sum in the expense of carrying on the business, and will also provide increased room for extending it.

The capital stock of the Corbin Screw Corporation is placed at \$400,000, and will all be owned by the American Hardware Corporation. The incorporators met in the office of P. & F. Corbin late Saturday afternoon and organized the new company, with the following Board of Directors: P. Corbin, A. Corbin, Chas. M. Jarvis, Chas. H. Parsons, Chas. Glover, of P. & F. Corbin; H. S. Hart, Theo. E. Smith, Benjamin A. Hawley, Clarence A. Earl, of Russell & Erwin Mfg. Company.

The following officers were elected:

President, Charles Glover.

Vice-President, Clarence A. Earl.

Secretary and Treasurer, Theodore E. Smith.

Assistant Secretary, Wm. J. Surre.

Charles Glover, president of the Corbin Screw Corporation, has been connected with P. & F. Corbin for nearly 30 years, and for the last 15 years has had charge of the Screw department of the company. Under his direction the business has grown very rapidly and become an important part of P. & F. Corbin. Personally Mr. Glover holds many valuable patents in this line of Hardware production, and has devoted his entire business life to the development of this particular branch of Hardware manufacturing.

Clarence A. Earl, vice-president of the Corbin Screw Corporation, has for a number of years been identified with Russell & Erwin Mfg. Company, commencing work in the New York office and gradually rising until at the present time he is second in charge of the sales department.

Theodore E. Smith, secretary and treasurer of the Corbin Screw Corporation, has been identified with Russell & Erwin Mfg. Company for over 30 years, having been formerly connected with the New York warehouse, but for 20 years past has been secretary of the company at New Britain, and has been identified with the management in one capacity and another for a long series of years.

Wm. J. Surre, assistant secretary, has long been identified with the Screw department of P. & F. Corbin as a salesman. Mr. Surre is a self made man, having formerly worked in the shop and gradually arisen to his present position through industry, prudence and frugality.

The Corbin Screw Corporation will take over the various properties about July 1, and will at that time commence business as a separate corporation, and although incorporated, the officials elected will not act as a corporation before that time.

Wakefield Mercantile & Mfg. Company, Wakefield, N. C., are now handling general Hardware, Stoves and House Furnishing Goods in connection with their former lines, including furniture, clothing, &c.

THE TRAVELING SALESMAN HIS METHODS AND CONTROL

BY SAMUEL MASTERS.

CHAPTER XVI.—CATALOGUES AND PRICE SHEETS

THE importance of keeping salesmen thoroughly informed regarding the goods to be sold and the prices and terms of sale is thoroughly recognized, and in this branch of the business few jobbers are at fault, although some of them have reached a much higher degree of perfection than others, the largest houses furnishing the best examples of how such work should be done. Jobbers with from

One to Six Men

on the road do not need the elaborate equipment that is required by those whose force numbers from 50 upward; and, in fact, depend upon individual letters where necessary to give immediate notices of change and let the balance go until the salesmen come in. The little houses, also, have no catalogues of their own, but make up for the salesmen collections of catalogues of manufacturers whose goods are handled. Occasionally an enterprising salesman for such a house will obtain the wholesale Hardware catalogue which of all those published most nearly covers his line, and after tearing out the parts which do not interest him and cutting off the heading with the name of the jobber who issued the book, have the balance rebound, adding such manufacturers' lists as can be bound with it to advantage. This is, of course, a makeshift not to be tolerated if anything better can be done.

The Jobber with a Catalogue.

The line between makeshifts coupled with lack of method and a regular system of issuing prices is past by the time a jobber has grown to a size which warrants him in issuing his own catalogue. A regular catalogue forms a basis for action, and the jobber who issues a book has a traveling force large enough to make it important to give changes in prices as fast as they occur, as a neglect to note an advance means a greater possibility for loss and a failure to post declines puts a greater number of men out of the market.

Loose Leaf Binders for Catalogues.

There have of late been important changes in the methods of cataloguing Hardware. A number of such books now in process of compilation will be issued in a loose leaf form, which permits the introduction of new leaves at any point and the substitution of new lines of goods for old as changes are made. One of the big Chicago houses issues a catalogue in this form, and at the time of writing a St. Louis jobber has this method under advisement. A Western manufacturer of a loose leaf cover recently announced that he had taken an order for 20,000 covers from a Western jobber. The loose leaf catalogue of Bigelow & Dowse of Boston, which was recently described in *The Iron Age*, is a good example of what can be done in this line at the present stage of developments. The ideal binder is, however, yet to be made.

The Ideal Binder.

The ideal binder will be the one which most nearly approaches in effect and appearance a book bound in the ordinary fashion; has no protruding posts or buttons or thumb screws to get in the way; does not require a special tool to unlock it; holds the sheets firmly when locked, but permits their ready withdrawal when loosened, and has a moderate range for expansion. It does not seem difficult to meet these requirements at a reasonable price, and doubtless it will be done soon.

Dead Matter Eliminated.

It is a fact which jobbers deplore that often between the times of printing the pages and issuing the book lists change upon many of the principal lines, and the catalogue is not reliable as to lists even from the very start. Besides, if a jobber changes his brand of, say, Steel Goods, Refrigerators, Enameled Ware, Builders' Hardware, or any other line covering a large assortment,

his catalogue is not only worthless so far as this line is concerned, but is a positive injury, since it continues to advertise competing goods.

All this the loose leaf catalogue corrects. Lines dropped can be removed and new ones substituted—often at the expense of the manufacturer—who is willing to stand the cost of the new pages for the sake of having his goods included in the jobber's catalogue, particularly if the catalogue is mentioned when the contract is made.

A Possible Drawback.

The only drawback to such a system is that the retail dealer will not always take the trouble to insert the new pages as they come, and this can be generally corrected by a little attention by the jobber's salesman, who should feel sufficiently interested in having his house adequately represented in his absence to see that the catalogue is kept up to date.

There is no other branch of business which is so well represented in its printed matter as the Hardware industry. The jobbers' catalogues are models of their kind, and for general excellence in style, scope and workmanship have never been surpassed in trade literature, and it only needs this loose leaf feature to give each volume accuracy at all times to make them of the greatest possible value.

Special Catalogues for Salesmen.

One large jobbing house prints for its salesmen separate catalogues with a very wide margin, upon which to write prices and note changes, the leaves being of a thin, tough linen paper. The book is of the loose leaf type, the only serious defect being the weighty and cumbersome binding.

Price Sheets.

The methods of giving prices to salesmen vary greatly, according to the size of the house and the number of its salesmen, the methods employed being in general about as follows:

One to six salesmen, individual letters.

Six to 15 salesmen, hectograph price sheets.

Fifteen to 40 salesmen, mimeograph or neostyle price sheets.

Over 40 salesmen, printed daily advices.

Each method answers, probably, all the requirements of the house using it, the most perfect and complete being, of course, the printed sheet.

Methods Contrasted.

When prices are issued by the hectograph, mineograph, neostyle or similar duplicating apparatus it is of advantage to have the stencil or first form written with a typewriter. A machine can be selected which contains the largest assortment of miscellaneous characters, and these can be taken off and replaced by the hieroglyphics of the jobber's cost mark, the type for such a purpose costing between \$1 and \$2 for each character. The salesmen thus get the prices in their most legible form. The hectograph furnishes 25 copies that are clear and distinct from a single writing, but it is not to be recommended for general use, owing to the variation of its work in different kinds of weather. Where a large number is desired and price sheets are frequently issued the rotary neostyle is the best duplicating arrangement to use, as it is rapid, cleanly and turns out work which is as clear and distinct as a typewriter. The total number of sheets used in any house is probably three times the number of road salesmen, as house salesmen, cost clerks, &c., must have as early and as accurate information as the men outside.

The Printed Price Sheet.

The printed sheets issued by a few of the very largest houses are, of course, the best, although the work of this kind done by one or two of the houses is susceptible of improvement. In these sheets the type is set in about the width of a newspaper column, with no attempt at display, and a small, cramped type is used. It would cost no more to use a little larger, plainer type, and to so space or divide the items as to make it easy for the salesmen to separate them. They can easily be printed so that salesmen can cut them apart and place them between the leaves of the catalogue when advisable to do so.

HARDWARE FACTORY COST METHODS.

AT the request of *The Iron Age*, Herbert Foster, chief accountant for one of the largest and most progressive manufacturing concerns in Connecticut, describes in the following pages a system of departmental and costs accounts in manufacturing devised by him.

merits of its design artistically, both of which naturally help to promote the sale of goods, unless the manufacturer knows absolutely the cost of producing the goods and the cost of selling them he is "out of the race." Costs are of prime importance. They are to the manu-

Need of Cost System

goods overlook and that is, not only the desirability, but the necessity of knowing precisely how much money is

factor what the compass is to the mariner. There is, however, another very important feature which most manufacturers who make a variety of

DEPARTMENTS									
	A	B	C	D	E	F			
TOTALS	10381639.17	3591631.71	1481064.53	351931.64	143261.35	181921.44			
Sales	3071.87	2941.82	733.57	507.13	52.07	303.44			
Foreign Exchange	2171.95	609.46	172.49	425.78	144.18	170.56			
Commission on Sales	5839.85	4016.45	1269.87	180.15	153.34	342.97			
Interest	4431.43	3000.06	1269.87	180.15	153.34	342.97			
Loss and Gain	3372.93	7850.95	604.89	25.82	6.22	12.80979			
Gain	4851.84	1811.77	21759.78	2326.09	9.73	12.80979			
Loss	1842.32	3492.93	21813.98	727.57	1519.57	18.60372			
Merchandise	14236.17	6352.34	54.80	3876.46	1829.50	18.60372			
Merchandise Purchased	32661.45	458.1	27902.16	2250.75	1649.07				
Material	374607.64	110216.46	28576.76	2410.76	1649.07				
Material	129761.03	95441.12	674.60	139.97					
Iron and Steel	880051.127	238853.84							
Wire	141772.34	141772.34							
MANUFACTURING EXPENSES	366667.36	143939.59	80082.48	43026.43	12600.87	324.01			
Coal	21021.02	80082.48	1013.12		76.51				
Oil	17131.15	5037.82	427.42		501.38				
Brass	26959.68	827.21	2085.83		7735.91				
Copper	13501.78	96163.20	42246.66	29846.31	7735.91				
Labor for Manufacturing	244759.171	68773.77	42246.66	29846.31	7735.91				
Manufacturing Expenses	144759.171	144759.171	5335.99	1865.84	1201.55				
Manufacturing Supplies	26663.20	14440.36	5335.99	1865.84	1201.55				
Packing and Shipping Supplies	29076.38	17666.18	5335.99	2218.53	1652.91				
Freight	1657.10	2459.40	1851.76	102.61	518.61				
Water Power (Rent)	1600.00	132.00	1186.00	100.00	98.88				
GENERAL EXPENSES	132650.2	4521.27	2632.06	799.72	163.77	223.94			
General Expenses	132650.2	4521.27	2632.06	799.72	163.77	223.94			
Legal	472.00	128.00	160.00	311.24	67.04				
Postage	1915.26	850.4	330.07	102.07	26.42				
Salary for Factory Use	859.75	275.10	190.00	45.16	9.01				
Lighting	415.45	108.60	158.70	12.10					
Telephone	139.84	35.80	21.45	17.95					
SELLING EXPENSES	120644.78	37845.30	5011.84	5011.84	1545.30	1842.66			
Selling Expenses	120644.78	37845.30	5011.84	5011.84	1545.30	1842.66			
Agency Expense	26531.74	19355.33	2259.33		624.42				
Advertising	12131.45	4234.15	4510.64	1024.08	124.06				
Carriage and Freight	2200.07	74.88	23.07	23.07	13.86				
Freight and Express Outgoing	3670.92	7509.28	942.31	322.56	153.54				
Freight and Express Incoming	1314.58	3940.56	1213.50	292.90	430.50				
Rent of Agencies	13513.50	6681.90	1213.50	292.90	430.50				
ADMIN. EXPENSES	46101.23	14744.05	6808.28	2461.24	614.54	776.44			
Admin. Expenses	46101.23	14744.05	6808.28	2461.24	614.54	776.44			
Insurance (Mutual)	20694.66	2176.78	837.78	2461.24	614.54				
Salary	659.50	2176.78	837.78	2461.24	614.54				
Office	18742.88	13555.69	257.05	2461.24	614.54				
Taxes	5350.66	1172.86	484.78	188.19	48.86				
DEPRECIATION	22477.66	10557.15	2974.64	149.50	311.60				
Depreciation	22477.66	10557.15	2974.64	149.50	311.60				
Buildings	1032746.01	457074.47	503567.79	503567.79	16575.55				
Equipment	1032746.01	457074.47	503567.79	503567.79	16575.55				
PER CENT ON SALES	70349.50	46491.32	46491.32	46491.32	46491.32				
Gain	9.25%	9.25%	9.25%	9.25%	9.25%				
Loss	6.07%	6.07%	6.07%	6.07%	6.07%				
ANALYSIS OF GAIN									
Dept. A	46491.32	46491.32	46491.32	46491.32	46491.32				
Dept. B	21723.46	21723.46	21723.46	21723.46	21723.46				
Dept. C	11396.39	11396.39	11396.39	11396.39	11396.39				
Dept. D	1343.44	1343.44	1343.44	1343.44	1343.44				
Dept. E	2347.66	2347.66	2347.66	2347.66	2347.66				
Dept. F	2429.41	2429.41	2429.41	2429.41	2429.41				
Net amount of Gain for year agreeing with amount of Profit carried to Surplus Account in General Ledger	3691.30	3691.30	3691.30	3691.30	3691.30				
	3691.30	3691.30	3691.30	3691.30	3691.30				
	3691.30	3691.30	3691.30	3691.30	3691.30				

Net amount of Gain for year agreeing with amount of Profit carried to Surplus Account in General Ledger

Fig. 1.—Yearly Report.

which is the result of several years' practical study and experiment upon original lines, and is accomplished without expensive or cumbersome detail.

SYSTEM OF ASCERTAINING AND TABULATING COSTS.

BY HERBERT FOSTER.

In the present age of rivalry and keen competition, no matter how well manufactured an article may be, or the

made or lost on each class of goods manufactured or dealt in. Owing to the short space that can be allotted to an article of this nature, it is possible only to give a comprehensive description of results obtained; the actual detail and forms must be omitted.

The specimen yearly report shown in Fig. 1 may for convenience in understanding be assumed as follows:

Department A may stand for Builders' Hardware.
Department B may stand for Door Locks.
Department C may stand for Padlocks.

Department D may stand for Cabinet Hardware.
Department E may stand for Steel Butts.
Department F may stand for Tinned Hardware.

The figures shown do not represent any actual copy, but are made up for the purpose of showing the intent and scope of the department accounts and show only the representative department's figures—that is to say, after all manufacturing departments (plating, buffing, &c.) have been distributed correctly to the departments proportionately according to work performed for them.

There is also an Unclassified Department, where such

may be treated as a detailed auxiliary of the Private or Controlling Account Ledger, the latter being preferable.

COSTS.

Of the many methods of obtaining Costs, that where all Incidental Expenses are based upon Productive Labor, or where the Incidentals are added to Productive Labor by the man-hour basis appears the most satisfactory and most nearly correct. To arrive at the cost of Productive Labor the daily card system is the *only* correct method. As will be seen (Fig. 2) John Smith starts work at

Productive Labor

7.00 A.M. and crosses out figure 7. He works on this first job, "Tumbling Keys," until 11.30, when he sweeps up the shop until 12. He crosses 11.30 to indicate a new job, and crosses 12, when he stops for the noon hour. At 1 he starts "Tumbling Locks," and works at this job until 6 P.M. He has consequently worked 10 hours—9½ hours productive and half hour nonproductive labor. This will illustrate the method of ascertaining Productive and Non-Productive Labor by Departments. There is also General Non-Productive Labor, which consists of oilers, truckers and other unassigned workers, which constitutes a necessary "general expense."

In order to arrive at a basis for all other Incidental expenses it is necessary to obtain (after separating Labor) Manufacturing Expenses from the Department Accounts, and compute on the basis of Productive Labor, as shown in Fig. 3. If these percentages, according to class of goods, be added to the actual Productive Labor used in making the article, it will cover all

Non-Productive Expenses

Non-Productive Expenses. Then, of course, must be added cost of Material and finally Selling Cost and Profit.

The man-hour basis to cover Incidentals, outside of Non-Productive Labor, referred to, is considered by some experts the better plan. It is arrived at by dividing your department Incidental Expenses by the total number of Productive hours; this will give the cost per hour to be added. For instance, if your Incidental Expenses for a given period were \$500, and in the same period your productive hours amounted to 5000, your Incidental cost would be 10 cents per productive hour, to be added.

If it is deemed desirable to ascertain the cost of different lots of similar articles manufactured at various times, it is necessary that the manager or superintendent give each lot an Order Number when order is first issued

Cost of Different Lots

to factory. This Order Number, following goods through the various processes in the factory, has charged against it every item of labor performed upon it until completion. For the purpose of comparison of Costs on same articles at different periods, manufactured under varying conditions, its value is apparent.

There is this to be said regarding Costs: While like bookkeeping, the same fundamental principles are involved, yet the same arbitrary rules cannot be applied to all cases. There must be modification of methods to suit different lines of business. This is where the competent accountant demonstrates his ability and value; and unless he has the necessary knowledge of manufacturing as well as the scientific method of treating accounts, and, above all, is earnest in his efforts to produce accurate and thoroughly reliable results, his work is more than useless, no matter what "system" may be used to obtain results.

Adapting Methods

P. Scharf has disposed of his Hardware business in Newton, Iowa, to H. S. Rayburn & Co. Mr. Rayburn was formerly identified with the Miles Hardware Company of Mason City, Iowa, but recently sold out his interest to W. R. Davis.

NO. 1173		DATE Dec 20 1901	
NAME John Smith			
10	5 10 15 20 25 30 35 40 45 50 55	11	5 10 15 20 25 30 35 40 45 50 55
9	5 10 15 20 25 30 35 40 45 50 55	12	5 10 15 20 25 30 35 40 45 50 55
8	5 10 15 20 25 30 35 40 45 50 55	1	5 10 15 20 25 30 35 40 45 50 55
7	5 10 15 20 25 30 35 40 45 50 55	2	5 10 15 20 25 30 35 40 45 50 55
6	5 10 15 20 25 30 35 40 45 50 55	3	5 10 15 20 25 30 35 40 45 50 55
5	5 10 15 20 25 30 35 40 45 50 55	4	5 10 15 20 25 30 35 40 45 50 55
4	5 10 15 20 25 30 35 40 45 50 55	5	5 10 15 20 25 30 35 40 45 50 55
3	5 10 15 20 25 30 35 40 45 50 55	6	5 10 15 20 25 30 35 40 45 50 55
2	5 10 15 20 25 30 35 40 45 50 55	7	5 10 15 20 25 30 35 40 45 50 55
1	5 10 15 20 25 30 35 40 45 50 55	8	5 10 15 20 25 30 35 40 45 50 55
ORDER NO.	STATE OBJECT WORKED UPON		FOR DEPARTMENT
	Tumbling Keys		TIME 1 1/2
	Sweeping Shop		TIME 1/2
	Tumbling Locks		TIME 5-1/2
			AMOUNT 1.25
			10-1/2 1.25

Fig. 2.—Daily Time Card.

Items as, for instance, all Administration Expenses and the major portion of General and Selling Expenses are placed until the end of the year, when they are distributed to the representative departments. It is here that the accountant has to have the correct method for proportioning these expenses.

As said before, in so short a space the detail for producing these accurate results cannot be described. Summed up briefly, however, as a glance at the report will indicate, it is an analysis of every item of expense connected with the manufacture and sale of goods, together with the sales themselves, and deductions therefrom, and the general administration of the business. It will also be observed that by making use of various figures from the report, together with others obtained from another source, we are enabled to ascertain the proper percentages to be added to Productive Labor to cover all Incidental Expenses in the computation of Costs.

Percentages to be Added

This system is adaptable to mercantile enterprises as

		Departments						General Non Prod.
		A	B	C	D	E	F	
Dept Non-Productive	%	2.2%	10%	7%	10%	5%	6%	
Genl	%							14 1/2%
Coal, Oil, Labor	} Mfg Expenses	30%	16 1/2%	17%	13%	39%	13 1/2%	
Interest, Expense, Postage, etc		1.5%	3%	3 1/2%	4%	4 1/2%	6%	
Insurance, Salary, Taxes	} General Expenses	2 1/2%	5%	6 1/2%	1 1/2%	7 1/2%	13 1/2%	

Fig. 3.—Percentages for Incidental Expenses.

well as manufacturing, only necessitating a change in the titles of accounts. The Department Account Ledger may be run independently of the General Books of account, or

BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE,
NORFOLK ST., LONDON, W. C., April 25, 1903.

The Week's Hardware Trade.

BEYOND the usual little spurt in business activity consequent upon the turn of the quarter, trade in the Hardware centers is moderate. There is no actual shortage of orders, but there is plenty of room for improvement. In addition, on manufactured goods the margin of profit is exceedingly small, and in many ways manufacturers and business men generally are dissatisfied with the situation. Owing to the backward spring orders still arrive for Horticultural Tools, Rollers, Mowers and Irrigating Appliances. The building trade continues quiet, but notwithstanding this Stove Grate and Range manufacturers are fairly busy. During the week there has been quite a brisk demand for Baths, Siphon Cisterns and Stable Fittings. Owing to the better understanding arrived at among the Bedstead manufacturers, about which I have previously reported, a distinct improvement has taken place in the Bedstead trade. The association is re-established on a new footing, and the recovery extends to the Tube, Mount and Caster branches. General Brass foundry is comparatively dull for this time of the year, the best sections in this department being Hinges, Cabinet Handles, Sash Fasteners and Tubular Work. Makers of Chandeliers and Gas Fittings have received some good orders for South Africa and the colonies, but on the whole trade is quiet in all these branches. Some large ship and export orders are being executed for Electro-plated Spoons and Forks and general Table Ware. The Britannia metal trade is active and silversmiths are doing well in Toilet Goods, Flower Vases and domestic knickknacks. Galvanized Iron is wanted in heavy lots, and the domestic galvanized articles and Japanned Ware also show some improvement. A large number of different kinds of Pumps, chiefly for export, is being made and sold, and the demand is good for Edge and Rope Making Tools.

On overseas account there is not much to report. The best business just now is being done with Argentina, in consequence of the resumption of cattle shipments, coupled with the good harvests, about which I have already written fully.

American Nuts, Bolts, Tubes, Etc.

Last week I sent you extracts from the report of Robert Holmshaw upon American Cutlery as compared with British. This week I would direct attention to the report by T. Jones, who represented the Midland Counties Trades Federation as another delegate on the Mosely Industrial Commission. A great many of the articles made by Americans are in keen competition with Midland products. The material examined and commented upon by Mr. Jones and of interest to American Hardware manufacturers covers Nuts and Bolts, Tubes, Edge Tools, Chains and Files. Mr. Jones, in part, writes as follows:

The first works I had an opportunity of visiting was a Nut and Bolt works. They did not make any of the larger sizes. The workshop was packed with machinery; there was scarcely any hand labor. The forging machines run very fast, and they make large quantities. There were 100 large machines in one shop, and on the second floor quite 200 more, worked chiefly by youths, who look after two or three machines. Many of them headed, pointed, screwed and cut the Bolts off automatically, turning out vast numbers. All the machines with the latest improvements had been introduced by the foremen, who derive a benefit from their ingenuity. They work ten hours a day. The lads earn from 5 pence to 1 shilling per hour. There is not much piecework. The forgers earn from 12 to 13 shillings per day. Another works I visited in the same town the same remarks apply to, except there was a considerable number of girls working some of the machines. Many of them are automatic, and require no labor, only supervision. The girls earn about 3 shillings 4 pence per day; the work appears to agree with them, for they looked healthy and robust.

The works I visited in another town were the largest of the kind in America. They employed 2400 men. Their warehouses are $\frac{1}{2}$ mile long and over 90 feet wide. They roll most of their own iron for Nuts and Bolts. They use large quantities of scrap made in piles fixed on pieces of wood, which keep the piles together and go

in the furnace. They have some thousands of tons of scrap and have no difficulty in getting all they want. They roll rounds or flats of exceptional length. The whole of the furnaces are heated with oil and coal ground to dust for this purpose. All the forging is done with machines, of which there is a large number and of great variety. Men work ten hours a day and earn from 12 shillings 6 pence to 24 shillings per day. The Nuts are made in the same way as here, but their machines work faster. A youth will head and square under head and cut off 5000 $\frac{1}{2}$ -inch Bolts per day. They have some Screw cutting machines screwing eight and nine Bolts at a time, youths feeding them. Many of the machines are automatic.

TUBES.

The largest manufacturers of Tubes are supposed to be the National Tube Works Company, whose principal works are at McKeesport, some few miles from Pittsburgh. An application for permission for us to go through the works was made by Mr. Jarrett, of the Iron and Steel Works' Union, and was met by the reply that the English Tube manufacturers had refused members of the firm admission to their works, so they had decided to adopt the same course toward Englishmen. An application made by me at Philadelphia met with no better success, the works there and at Reading being part of the National's concern. It was rather hard lines on us that we should have the sins of the employers in this country visited upon us for any act of theirs, over which we had no control. But in spite of this prohibition I was able to visit some works on a large scale.

The works I visited the men worked 60 hours per week, and the furnaces worked night and day. Here, as in other industries, machinery plays a more important part in the manufacture than in this country. The result is (not that the men work harder) that the Tubes are longer, and they make more of them in a given time than we do, and with a less number of men. Tubes are made up to 16-inch. From the strip to the finished Tube they are moved about by machinery worked by youths. The Tubes, by an ingenious arrangement, are kept perfectly straight when finished, and do not have to be sprung, as they do here. Each Tube registers itself so that there can be no mistake in the count, and the welder can see at any time how many Tubes he has made in a given time.

Malleable and cast fittings are largely used on Tubes in America; few wrought iron ones are used. But the sockets are wrought iron. Every hotel, office, railway station, tramcar, railway train, and almost all works are heated in winter, so that there is a very large demand for home consumption. They store very heavy stocks. Trade is very dull with them at present.

Sockets are made under different conditions from what they are here; there is a subdivision of labor. For instance, the socket maker does not turn them—that is done for him—he simply welds and finishes them. He works hard, and is well paid for it, getting about 14 shillings 6 pence per day. Welders get about the same, or rather more; other workmen get from about 9 shillings 6 pence to 11 shillings per day.

They have special machines for expanding or reducing the size at the ends of Tubes for 7 or 8 inches. In moving large Tubes about, where there is no machine to do it, they use iron trucks, one at each end of the Tubes, and not one in the middle of the Tube as we do; they are more easily worked. There are no coal furnaces, all are heated with water gas, socket furnaces as well. There is no smoke in the furnace, and the Tube can be seen all the time. The welder can see from some distance when it is ready, and he has only to put the machinery in motion. The gas is manufactured by themselves; they have 18 converters for that purpose. There are a number of valves along the side of the furnace, so that the heat can be regulated instantly. They have (compared with our manufacturers) enormous stocks laid down in huge stacks close by the siding, so that they can be loaded into the trucks (cars) when required. The trucks are over 30 feet long. Railway sidings run into most of the works. The trucks run up an incline and are emptied bodily, thus saving cost of unloading.

The works are not so crowded as they are here. There is much more space per man, and the result is the Tubes can be moved about by the machines without any one touching them. No less than three foremen in one Tube works I visited were Staffordshire men, who had left the old country in the hope of bettering their positions. They had not been disappointed.

EDGE TOOLS.

The Americans get 30 per cent. of the trade with our colonies, and in Edge Tools there is no doubt they have some reason for it. They claim that it is due to the fact that they manufacture what their customers require in any country, and do not make one article for universal use, nor decline to alter it to suit different

methods in different countries. They have a monopoly in South Africa for their Adzes or Claw Hammers. In style and finish they are different from ours. An overwhelming majority of Axes and Hatchets are sent from the States compared with ours. On the other hand, it is admitted that most of the Adzes used are of English make.

CHAIN.

I ascertained there was a Chain works at Lebanon. I knew one of the workmen; several Englishmen were working there. Two men from Cradley Heath were working the Chain on the side weld. They were the only two in the shop who would work on the side welding. It is a large factory, well ventilated and open in summer time. They make from the smaller sizes up to 3 5-16-inch. They work on the same methods as over here. They have no machinery for making Chain; they test it in the factory. Their prices are considerably higher than they are over here. I compared some of their prices with ours, and found a great difference in their favor. Nothing would induce the English workmen to come back and work at the prices we are paying, though they talked of taking a trip to England and changing a \$200 bill. The managing superintendent was a Cradley Heath man, who had brought his wide and varied experience into the trade there, and was managing a successful undertaking. This was not the only case by many I met in which men of skill and ability had left the Old Country because they could get a better return for their labor than at home, and thus became our competitors. I met with men from other Chain works, and their conditions and experiences were the same as above described.

FILES.

American Files have a large sale in our own colonies, because they are manufactured to suit the requirements of their customers. In some colonies they are largely used; especially is this so in the Saw Files. The American Files are lighter than the English ones; they are seldom recut by the colonials. Horse Rasps are largely exported; they sent showboards out displaying samples in an attractive manner—a procedure the English manufacturer has not yet thought of. They are mostly machine made, and the workers get good money.

Machinery in the File Trade.

An increasing factor in the Sheffield trade is the growth of machinery for the manufacture of Files. Machinery for forging, grinding, cutting and stripping has been brought to such perfection that hand labor is being practically superseded. At first machinery dealt chiefly with large Files, but now it takes in many of the smaller sizes. In recent years considerable numbers of men have left the trade for other employment, and still there is a serious lack of employment among the hand workers. Competition has become so keen that manufacturers have had to resort to machinery if they would keep their connections together, with the result that men who had worked for firms for long years have had to leave. At the present time, although some houses complain of slackness and increasingly severe competition on the part of foreigners, others find as much as they can do to fill the orders they receive, and are extending their premises and plant to enable them to deal more conveniently with their increasing business. Sheffield manufacturers are impressed with the belief that they could overcome American competition if purchasers would insist on the same weight and make for the American article that they insist on when ordering from British makers. Inasmuch as buyers refuse to take English Files of the same weight and make as those with which American manufacturers are winning the market, it follows, I think, that there is something else in the trade than methods of manufacture. Methods of advertising, methods of selling, methods of export, all tell their tale in the long run. The moral is to be up to date.

Canada and the British Hardware Trade.

Midland Hardware manufacturers are interested in an experiment which has been made by the Dominion of Canada in the appointment of P. B. Ball as commercial agent for the Dominion of Canada in Birmingham and district. He has been commissioned by the Canadian Government to perform the functions which usually come within the scope of a consular office, but he is not merely to be concerned with the business of manufacturers in his own country. He is to assist those in the Midlands, or, for that matter, anywhere in the district, with information in regard to opportunities for trade with Canada.

It is not a one-sided arrangement therefore. While anxious to assist their own exporters, the Canadian Government has placed here an agent who, without fee of any kind, will be pleased to do just as much for those of Birmingham and the Midlands. Mr. Ball assures Midland manufacturers that Canada is anxious to increase her trade with Great Britain. He says that Canadians feel that the 33 1-3 per cent. preference in the tariff ought to do more for Great Britain than has yet been done. The idea of the appointment is that while he will be able to advise British importers of foodstuffs where to get the best that Canada can supply, he reciprocates by telling the manufacturers of metal goods how best to place their commodities in Canada. The complication which has just cropped up between Canada and Germany will, it is thought, substantially help British exporters. Mr. Ball's own description of this imbroglio is as follows:

Germany has during the last five years or so added from 15 to 25 per cent. on different articles exported by Canada. We have tried to get these removed, but, without success, and so we have imposed a surtax on German goods, under which a duty one-third more than that charged against other nations has to be paid. If, therefore, the duty on a particular article is 30 per cent., Germany pays 40 per cent., and Great Britain 20 per cent. We have no desire to invite quarrels, but this is part of our policy, and incidentally it ought to be beneficial to Great Britain. Our imports from Germany in 1902 amounted to about \$9,250,000, and our exports to them to about \$1,750,000. The surtax ought to enable Great Britain to obtain some of that \$9,250,000, which represents manufactured goods. Then there is also the question of foreign goods, on which at least 23 per cent. of the work in the finishing state is executed in Great Britain. These goods are also eligible for the preferential tariff, and though I am not able yet to say how the new law will affect the business, I imagine it will be beneficial to Great Britain.

BENJAMIN S. ALDER.

THE firm of Alder & Boyd were dissolved by limitation May 1. Mr. Alder announces that he will continue the business at the same address, 37 Warren street, New York, as manufacturers' representative in Hardware. It is also announced that W. W. Crowell, formerly with Surpluss, Dunn & Co., has associated himself with Benjamin S. Alder, who will continue to represent the following concerns, viz.: Wrightsville Hardware Company, Cast Iron Hardware; E. T. Fraim (Keystone Lock Works), Padlocks and Latches; Warren Axe & Tool Company, Axes of all kinds; Oswego Tool Company, Tube Expanders, Pipe Cutters and Vises; Pennsylvania Electric Company, Blowers and Forges; Knapp & Cowles Mfg. Company, Screw Drivers, &c.; Hollinger Fence Company, Shovels and Spring Cotters; Williamsport Iron & Nail Company, Cut Nails; C. E. Jennings & Co. (export only), Carpenters' Tools. Mr. Alder's experience and his familiarity with both domestic and foreign trade, coupled with his wide acquaintance, promise well for his success in thus continuing an established business, in which he will have the best wishes of many friends.

CORNELIA E. MERRITT.

MRS. CORNELIA E. MERRITT, president of the David Maydole Hammer Company, Norwich, N. Y., who succeeded to that office on the death of the late President Martin, died at her home in Norwich, April 17, of apoplexy. Mrs. Merritt was a daughter of David Maydole, the founder of the business. Mrs. Merritt was possessed of much business tact and executive ability, owning a half interest in the company as well as being the proprietress of the Chenango semi-weekly *Telegraph* and the morning *Sun* of Norwich. The erection of the new and substantial shops of the factory was a matter of pride with her, an enterprise she pushed forward with unabated energy to the last. She was closely identified with anything designed to improve the town of Norwich and a liberal contributor for such purposes, having been for 20 years president of the Ladies' Village Improvement Association.

W. S. Fallis, Clarinda, Iowa, has disposed of his stock of Shelf Hardware, Stoves, Tinware, Harness and Sporting Goods to John Spring, who continues at the old stand.

PRICE-LISTS, CIRCULARS, &c.

THE BLACK SILK STOVE POLISH WORKS, Lewis D. Wynn, proprietor, Sterling, Ill.: Catalogue devoted to Stove Polish in paste and liquid form, Range Gloss for grates, fenders, mantels, stove pipe, &c., and White Silk Metal Polish for cleaning and polishing brass, copper, tin, &c.

THE N. & G. TAYLOR COMPANY, Philadelphia, Pa.: "The Arrow." This is a small monthly booklet devoted to the merits of the company's Tin Plates, which they are sending regularly to their friends and patrons.

THE BALLARD BURNER COMPANY, Ottawa, Ill.: Illustrated catalogue of Student Lamps and One, Two and Four Light Chandeliers. The company state that the Ballard 70 candle power light is produced from the lowest grade of kerosene by scientific process, securing cheap illumination.

THE AMERICAN CAN COMPANY, New York and Chicago: Illustrated price-lists Nos. 2 and 3, devoted to Tea, Coffee and Spice Cans, Caddies and Scoops, Sample Room Office Packages, &c. Catalogue No. 2 represents Eastern and No. 3 Western styles of these goods.

THE WALTHAM MFG. COMPANY, Waltham, Mass.: Catalogues illustrating Orient Bicycles, Motor Bicycles, Motor Buckboards and Automobiles, and Motors for Bicycles and other motor vehicles.

THE BLAKESLEE FORGING COMPANY, Plantsville, Conn.: Catalogue illustrating Carriage, Coach and Wagon Forgings. The company also manufacture special Drop Forgings to order, meeting the demands of each particular customer.

THE UDELL WORKS, Indianapolis, Ind.: Supplement to 1901-02 catalogue, devoted to a line of Medicine Cabinets and Blacking Cases.

THE A. W. STEVENS COMPANY, Marinette, Wis.: Catalogue illustrating high grade Threshing and Corn Husking Machinery.

REEVES & Co., Columbus, Ind.: Catalogue No. 27, relating to Threshing Machinery.

S. ROEBUCK COMPANY, 172 Fulton street, New York: Descriptive catalogue No. 7 of their Wire Window Screens and Screen Doors, together with a few of their large lines of Weather Stripping, the latter being more minutely treated in catalogue No. 9.

C. B. ATKIN, Knoxville, Tenn.: Catalogue of Wood Mantels, illustrating in colors a line of these goods. In addition to factories and warehouses, a new saw mill has been put in operation specially adapted to making lumber for Mantels, and men and teams are employed in the manufacturer's own forest cutting timber, so, it is remarked, the plant is being operated on the forest to fire-side system.

JAMES L. TAYLOR, 30 Lawrence street, Newark, N. J.: The Taylor Quick Adjusting Self Locking Screw Clamps. A 1903 catalogue and price-list illustrates a line of Clamps, the smaller sizes made of air furnace refined malleable iron and larger sizes made of high grade steel bar. They are designed for the use of machinists, wood workers, carpenters, for structural work, &c., according to the size of the Clamps.

F. W. DEVOE & C. T. RAYNOLDS COMPANY, New York and Chicago: Catalogue and price-list relating to Varnishes. The catalogue includes Coach and Carriage, Railway, Furniture and Piano, miscellaneous and Spirit Varnishes, Shellac Spirits, Lacquers, Spar and Marine Varnish, Floor Finish, Wood Coating, Wood Finish, Carriage Top Dressing, Oil and Varnish Stains, Paint and Varnish Remover, Paint and Varnish Brushes, &c.

THE PHILADELPHIA LAWN MOWER COMPANY, Philadelphia, Pa.: Illustrated price-list devoted to the Genuine Philadelphia Lawn Mowers and to Lawn Sprinklers. The former are shown in high and low wheel and roller bearing.

A. W. ISELE & SON, Boston, Mass.: Catalogue for 1903 fully illustrating their different products, such as Railroad Track Chisels, Wood Track Gauges, Railroad Spiking Hammers, Face Hammers, Hammered Tool Steel Crow Bars, Hook Hammers, Ripping Chisels and other

tools. In their notice to the trade the firm state that after many years of experience in making Tools, and much contact with large users, they find a growing demand for high-grade Tools in place of the cheaper grades. They also state that their Tools are warranted, well proportioned and durable, with the stock placed in each Tool where needed.

THE MERKEL MFG. COMPANY, Milwaukee, Wis.: Catalogue illustrating and describing the Merkel Motor Cycles, also a price-list of parts.

THE ANGLE STEEL SLED COMPANY, Kalamazoo, Mich.: Catalogue for the season of 1903, illustrating in colors a variety of styles of Coasting Sleds and Coaster Bobs.

RETAIL HARDWARE DEALERS' ASSOCIATION OF THE CITY OF OGDENSBURG.

THE Hardware merchants of Ogdensburg, N. Y., have formed an association under the above title, as the result of a meeting recently held, which was attended by representatives of all the Hardware concerns, six in number, in the city, as follows: A. B. Chisholm of Loveland & Chisholm, Robert Bowman and James Bowman of Bowman Bros., R. J. Donahue, E. F. Hackett and Chas. W. Dings of Patrick Hackett Hardware Company; John Barr, W. D. Britton and J. Stacey Sayer, individual proprietors. The meeting was held at Mr. Britton's store, and was presided over by R. J. Donahue. The officers of the new association are: A. B. Chisholm, president, and Charles W. Dings, secretary. John Barr, who is a member of the New York State Association of Retail Hardware Dealers, and who had attended the recent annual meeting of that organization, addressed his fellow merchants and reviewed the work which the association was doing for the Hardwareman's welfare. Mr. Barr's earnest remarks favorably impressed his brother dealers with the utility of the State Association, and they have all since become members of the larger association.

This subject of local organization was fully discussed at the late meeting of the New York Association and has since been freely agitated by the officers. The first fruit of this agitation has been the formation of the Ogdensburg Association. It is to be hoped that some of the other cities of the State will follow suit, both in the way of a local coming together and affiliation with the State Association.

REQUESTS FOR CATALOGUES, &c.

The trade are given an opportunity in this column to request from manufacturers price-lists, catalogues, quotations, &c., relating to general lines of goods.

W. A. Green, formerly a member of the general store firm of W. A. Green & Co., Tyler, Mo., has lately engaged in the Hardware, Stove, Farm Implement, Paint and Oil and Sporting Goods business in Caruthersville, Mo.

Seymour Hardware Company have succeeded Johnson Hardware Company, Seymour, Iowa. The lines carried comprise Shelf and Heavy Hardware, Stoves, Tinware, Agricultural Implements, Sporting Goods and Paints and Oils.

Sioux Hardware & Heating Company, Sioux City, Iowa, have been incorporated with a capital stock of \$25,000. In addition to handling Shelf Hardware, Stoves, Tinware, Pumps, &c., the company will do a heating and plumbing business.

Gary Vinson, Hardware merchant, Waynesboro, Ga., advises us that he is in the market for everything concerned in the construction of a new brick church, especially Chairs, Heating and Lighting Appliances, &c.

THE AMERICAN AXE & TOOL COMPANY have removed their general and executive offices from New York to Glassport, Pa., where they have a new and large plant in operation. The export department retains its office in the Postal Telegraph Building, 253 Broadway, New York, as heretofore, under the charge of E. D. Eager.

THE ROBERTS HARDWARE COMPANY'S NEW STORE.

THE accompanying illustrations relate to the four-story building, of which the Roberts Hardware Company of Utica, N. Y., took possession last December. The store fronts on Genesee street, Utica's main business

effort was made to complete a plant in every respect modern and in beauty of arrangement unexcelled in the Hardware community. The store front, with heavy columns and two large show windows, with neat signs and display trimmings, make up a pleasing exterior. From the entrance, looking back through the ground floor sales department, the visitor is impressed with the stock arrangements and the beauty of the furnishings. The

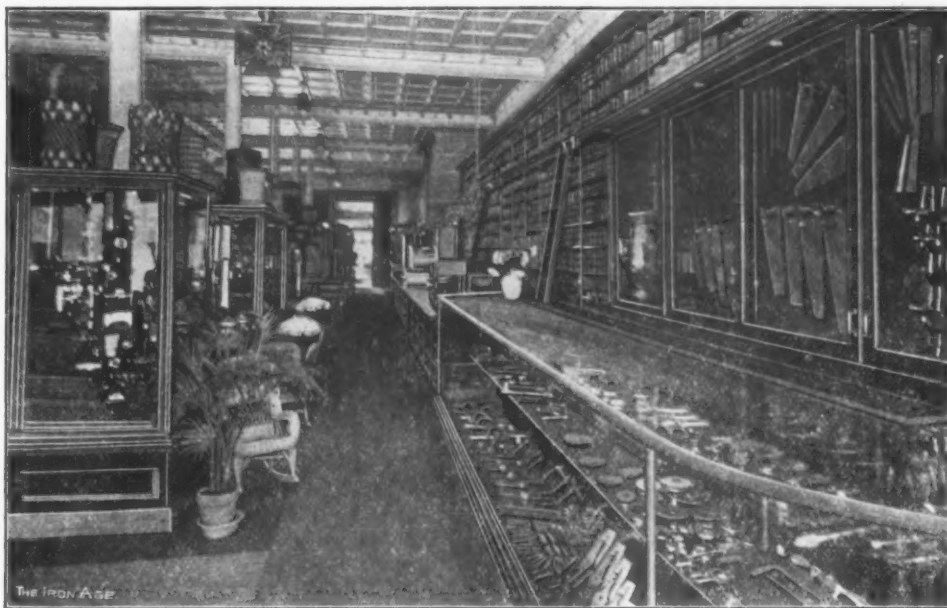


Fig. 2.—The View from the Right of the Entrance.

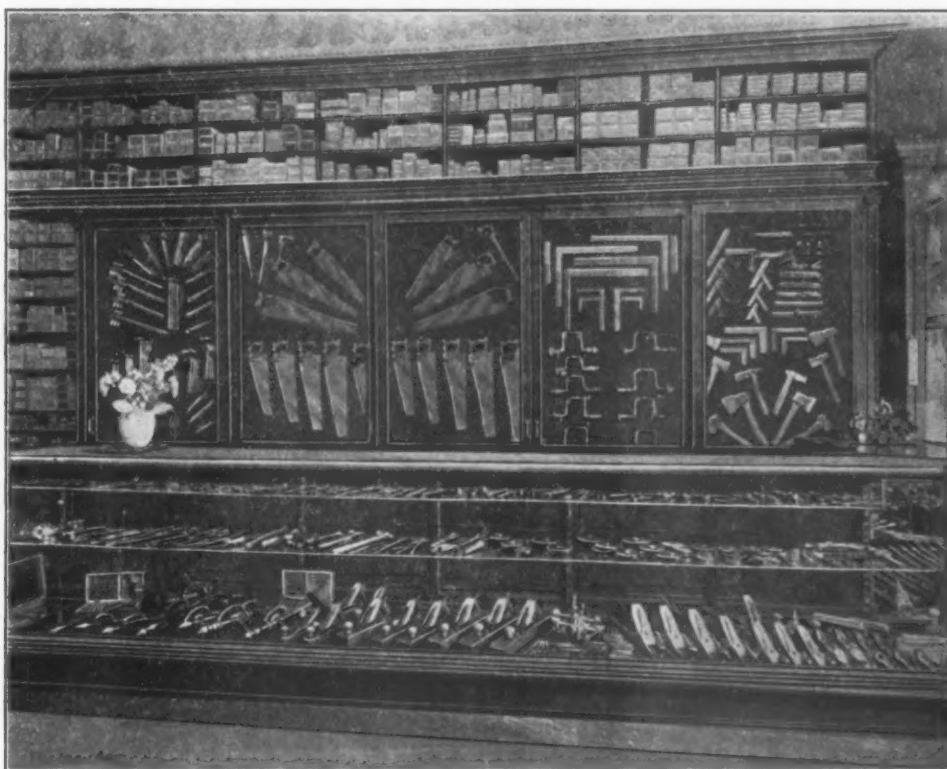


Fig. 3.—Detailed View of Floor and Wall Cases.

thoroughfare, and extends through to Hotel street, as shown in Fig. 1.

General Features.

In construction, every precaution was taken to secure absolute safety and against the possibility of fire. Steel columns and girders and double steel ceilings are among the safeguards. With convenience and utility assured, and with expense a minor consideration,

cases were made after designs furnished by Wm. H. Roberts, and conform to the spaces to which they are assigned. Each case is attractively lighted with incandescent bulbs. The bases are of marble, a material which does not readily mar and is easily cleaned. Rubber matting over the entire floor is a feature contributing to cleanliness and an absence of unnecessary noise. An electric cash system serves the entire store. The width of the room, 26 feet, admits of an attractive mid floor display of a sea-

sonable stock and miscellaneous light goods. On either side are wide aisles, and then the handsome floor and side wall cases.

Floor and Wall Cases.

At the right of the entrance, shown in Fig. 2, is a plate glass floor case, 25 feet in length, and a corresponding wall case, Fig. 3, in which Carpenters' and Mechanics' Tools are arranged in an attractive manner. On the same side of the room, toward the rear, is a cabinet holding about 300 small drawers containing miscellaneous Shelf Hardware.

Shelf Hardware.

The drawers are 18 inches long and 6 inches deep, and 6, 9 and 12 inches wide. The drawers are faced on the outside with dark green felt, fastened on by a small quartered oak molding. The felt matches the background of the wall showcases on either side of the store. Each drawer has a plain solid brass handle, and also a plain brass label plate. In this label plate there is a piece of black cardboard, on which is printed in white ink the contents of each drawer. The case complete is considered one of the handsomest in the store. A massive oak stairway, together with an inclosed electric elevator, occupy a place in the rear on this side of the building.

Ladies' Reception Room.

At the left of the entrance is an attractively furnished reception room for women customers, as shown in Fig. 4. Adjoining this is the handsomely arranged Cutlery and Silver Ware department, illustrated in Fig. 5. Chafing Dishes, Dining Room Goods, Carving Sets, Pocket Cutlery, an extensive line of each, are displayed to advantage. The Gun and Ammunition cases follow, and then Builders' Hardware, Lock Sets, House Trimmings, &c., with separate display room fitted up in modern style.

The Second Floor.

On the second floor the same artistic taste is manifested in the way in which the Household Furnishings are shown on the shelves and on the tiered floor tables. Stoves, Refrigerators and such goods are also displayed on this floor. Here also are the offices of the company, those of the firm principals and their staff in front, and the bookkeeping and cashier's departments in the rear. The remaining two floors in the Genesee street building, while utilized in a measure for displaying goods, carry a large stock of Shelf Goods required for the company's jobbing trade.

Shipping Department.

The shipping department is situated directly in the rear, and occupies the first floors of the warehouse, shown in Fig. 1. In this department is a handsome closed office, with the head shipping clerk in charge. This office is connected with the different departments by telephone. Orders are entered here and distributed among the dozen men employed in this department. These orders are all assembled in the shipping room, and when passed upon by the check clerk, are turned over to packers. The wall space in the shipping department carries deep shelving, on which are stored such goods as are in constant demand, Wood Screws, Files, Strap and T Hinges, &c. This department is also supplied with four freight platforms, located at the end and sides of the building. Dis-

patch and convenience are thus afforded in freight and package shipment.

The Warehouses.

On the remaining floors of warehouses Nos. 1 and 2, shown in Fig. 1, are carried Tinware, Granite Ware and the ever changing line of seasonable goods. In warehouse No. 3, the largest building of the group, is the Iron room, occupying the first floor. The floors above, three in number, are devoted to various lines of goods. A private driveway passes through this warehouse. Warehouse No. 4 is a steel lined one-story building, in which the stock of Nails and Wire is carried. Baskets, Wooden ware, Netting and Paper stock are kept in warehouse No. 5.

The Basement.

A high basement extends under the store and ship-

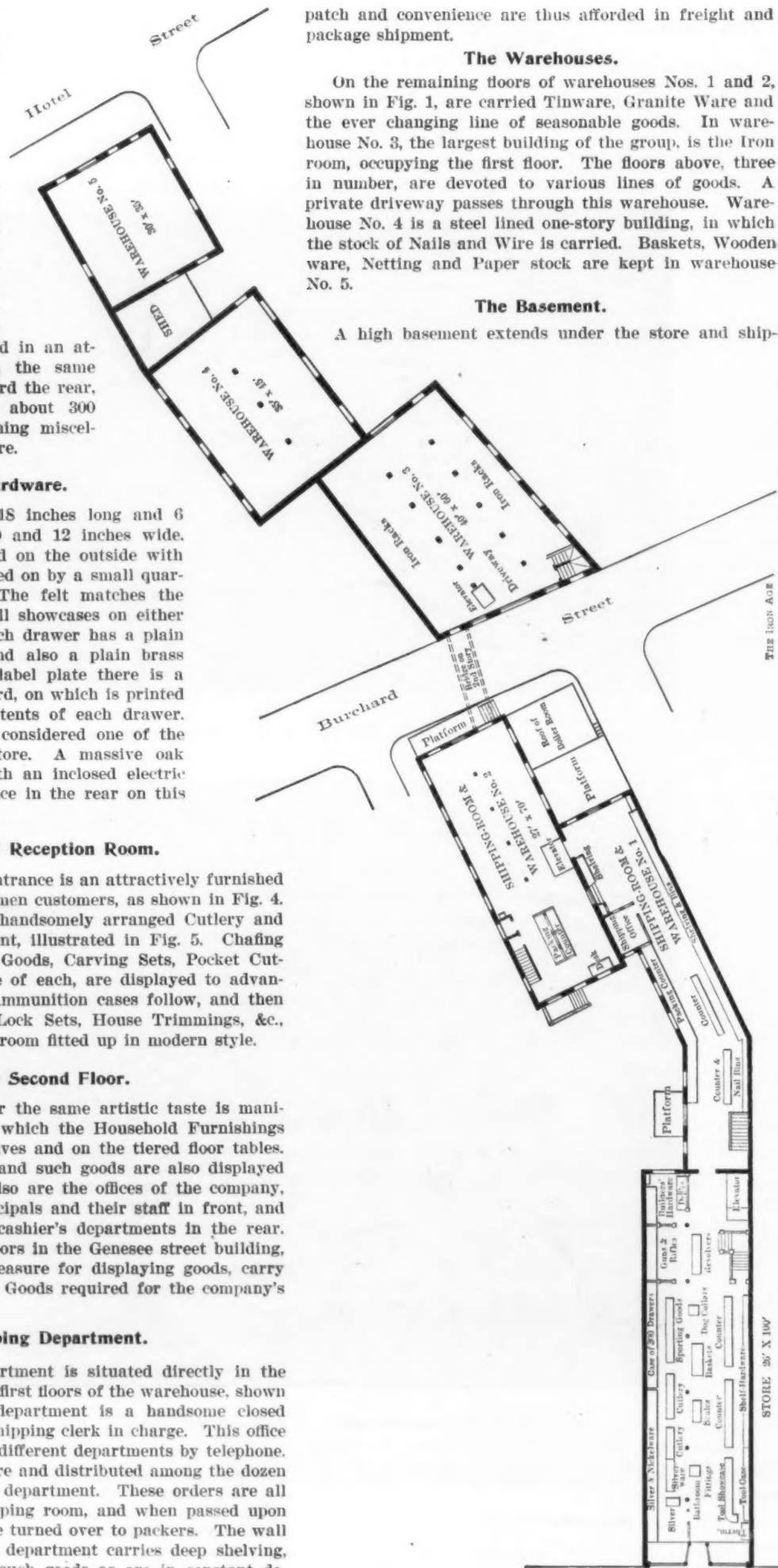


Fig. 1.—Floor Plan of the Roberts Hardware Company's Store.

ping department. Here is stored a large part of the heavy stock, considerable space being devoted to Sheet Iron, Bolts, &c. Each different grade and pattern has its special place, and each size and kind its own compart-

Advantageously Located.

In the establishment there are about 5 miles of shelving and 25,000 feet of floor space. The entire property is heated by steam and lighted by electricity.



Fig. 4.—Ladies' Reception Room.



Fig. 5.—Cutlery and Silver Ware Department.

ment, plainly marked to afford absolute convenience. Castings of various kinds, Rope, Chain, Sash Weight and the crated Stove stock are carried to and from the basement by power elevators.

The floor plan, Fig. 1, shows the convenient arrangement of the plant. There are four street frontages, exclusive of the private road. Another material advantage is its proximity to all the freight lines. Utica is de-

cidedly a railroad center, and the warehouses are within ½ mile of the furthest removed of the five freight houses.

A very important part of the company's business is the contract trade of Northern New York. This country, which has opened up so largely during the past few years, has contributed in no small measure to the volume of the firm's business. The demand of consumer, dealer or contractor for a large stock was met by an attitude on the company's part to increase the large lines already carried. A policy of prompt attention to and shipment of orders is adhered to rigorously. Orders received prior to the mid afternoon mail are shipped complete so far as possible on the same day. Another feature of the store is the neatness and cleanliness which prevails everywhere. Every department, in show and store room, has its special employee, who is responsible for the appearance of stock in that particular department.

History of the House.

John E. Roberts, as a young man in his twenties, chose the Hardware business. His first employment for the firm, in which he became afterward senior partner, was as night watchman and general roustabout through the working hours. In the fifties he became the "company" of Wood & Co. In 1860 the Wood interests were purchased by Henry Roberts, a younger brother of John E. Roberts. The style then changed to John E. Roberts & Co. Later the firm became Roberts, Parry & Co. through the retirement of John E. Roberts and the introduction of W. B. Parry, Henry Roberts retaining the financial and executive interests. In 1857 William H. Roberts, now sole head of the Roberts Hardware Company, a son of Henry Roberts, was given a small interest. In 1893 Wallace W. Roberts, another son of Henry Roberts, was given a share in the business. The death of Henry Roberts in 1895 brought no change in the firm name, but in 1897, upon the retirement of Mr. Parry, the firm name was changed to the Roberts Hardware Company, the business being owned by William H. and Wallace W. Roberts. The death of Wallace W. Roberts in 1901 was a decided blow to the firm's interests, removing a young man of marked ability, who contributed beyond his physical strength to the carrying out of the policies which he had materially aided in formulating. William T. Baker, who was admitted to partnership in 1902, takes no active interest in the business, and William H. Roberts, who has seemingly unlimited capacity for work, is the absolute head of the concern.

MISCELLANEOUS NOTES.

Chattanooga Roofing & Foundry Company:

Chattanooga Roofing & Foundry Company, Chattanooga, Tenn., successors to the Chattanooga Steel Roofing Company, are putting several new lines of goods on the market. Perhaps the most important of these is a line of air tight heaters, which are said to possess some new and attractive features. They have also added a galvanizing and nickel plating plant. They have adopted the cold galvanizing electro process, and will use it principally for galvanizing their Moomaw's patent New Century metal shingles. They will also be in position to do job work in the way of galvanizing steel, gray and malleable iron, ranging from screws and bolts to a large variety of plumbers' goods. Their nickel plating plant will be used principally for nickel plating the rails and trimmings of their air tight heaters. The company have also commenced the manufacture of a full line of hollow ware, and are just getting out a patent adjustable stove pipe cap, which is referred to as making it unnecessary for dealers to carry in stock several sizes of caps, as their cap will fit any size from 5 to 7 inch. The company are now issuing their 1903 catalogue, which is attractively printed and contains nearly 100 pages.

Ratchet Braces.

John H. Graham & Co., 113 Chambers street, New York, as direct representatives for Mason & Parker, Winchendon, Mass., have put on the market a ratchet

brace, with ebonized head and handle and nicked metal portions, that not only embodies some improvements, but is moderately priced for retailing at \$1 each at a good profit. It is made in 8, 10 and 12-inch sweep, has steel clad head to prevent splitting, steel sweep, new steel quill, new English pattern sleeve and cast steel jaws. It is put up regularly in packages of half a dozen, each wrapped separately, or in boxes at 7 cents per dozen extra.

The Foster Rubber Heel.

The Elastic Tip Company, 370 Atlantic avenue, Boston, Mass., are manufacturing a rubber heel which has a friction plug in the center to prevent slipping, to give a firmer tread and to make the heel last longer than the regular all rubber heel. The plug, or friction cloth center, is made of 30-ounce duck, frictioned with raw rubber, rolled in rolls of the proper size and then vulcanized in the heel. The fabric is cut on an angle of 45 degrees, so that a person wearing the heel walks on the end of the thread.

New Gem Spring Hinge.

The Columbian Hardware Company, Cleveland, Ohio, and 14 Warren street, New York, are putting on the market their new Gem spring hinge, which has been reconstructed. On the flanges a gauge for the carpenter has been added, by means of which he is enabled to quickly fit the hinge to the door and casing. New machinery has been installed for milling and fitting the joints so as to give a noiseless action in operating the hinge. The surface also has a genuine black enamel finish, which gives a smooth and brilliant appearance. The hinges are made in 3 to 12 inch flanges, both single and double acting.

Morrill's Hercules Interchangeable Punch.

Charles Morrill, 275 Broadway, New York, has just put on the market Morrill's Hercules punch, as here illustrated. The novel feature of this punch is that punches and dies are interchangeable. The punch is sold regularly with a set of three punches and dies, ½, 3-16 and ¼. He makes regularly for use in this punch dies having a diameter of 4, 5, 6, 7, 8 and 9-32, and special sizes can be furnished within these limits to order. The tool, 11¼ inches long, weighs 2½ pounds. It is made on the prin-



Morrill's Hercules Interchangeable Hand Punch.

ciple of utilizing a cam and lever to drive a plunger, by which great power is put into the handles and friction minimized. The manufacturer asserts that a pressure of 50 pounds on the handles produces 1000 pounds punching force. The punch is strong throughout, having a depth of throat of 1 inch wide. From center of die to front of throat measures ½ inch. The dies and punches are quickly removed and replaced by others as occasion requires. First the die is removed by unscrewing it, the punch being removed through the die hole by means of the key furnished with the punch. The new punch is then put in and followed by the die. The frame is of semisteel and the punch and die of best tool steel. A ¼-inch hole can be punched through No. 18 gauge sheet iron or its equivalent.

The Gold Medal Clothes Wringer.

The Gold Medal clothes wringer placed on the market by the United States Specialty Company of Marion, Ind.,

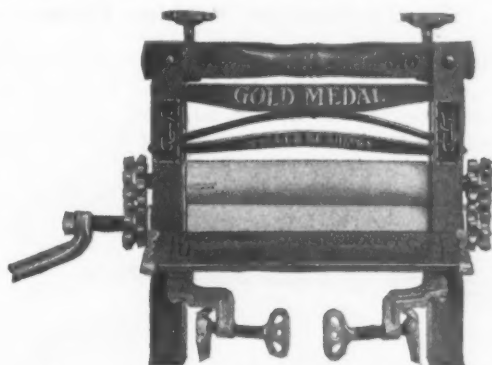


Fig. 1.—The Gold Medal Clothes Wringer.

is shown in Fig. 1. The patented roller bearings illustrated in Fig. 2 and patented clamps are the distinctive features of the wringer. The manufacturers remark that the rolls are made of solid rubber and that they are

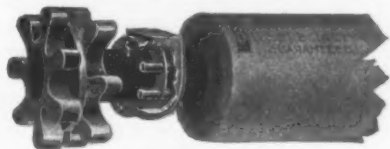


Fig. 2.—Patented Roller Bearings.

guaranteed for five years. The frame is referred to as unusually heavy, yet symmetrical. The wringer is highly finished, with bright galvanized trimmings. Each ma-



Fig. 3.—Wringer in Carton.

chine is packed in an individual carton, convenient and practical for shipping and affording protection while in stock, as shown in Fig. 3.

The Pet Lawn Trimmer.

The Lehr Agricultural Company, Fremont, Ohio, are offering the lawn trimmer shown herewith. It is ex-



The Pet Lawn Trimmer.

plained that it will pick up the bushy edges of the sod next to the side walk; that it will carve out a little

strip of sod and deposit it on the walk several inches from the edge, where it may be easily swept up; that it will leave a small clean valley between the edge of the walk and the sod, giving the lawn a neat appearance. The trimmer can be adjusted to run either deep or shallow. The small disc shown in the cut is designed for use in trimming around the edges of flower beds only. The disc is slipped on the main shaft between the mold board arm and the cast iron gauge wheel.

The Never Burn Bread Pan.

The Bronson-Walton Company, Cleveland, Ohio, are putting on the market the pan shown herewith, which is also made single and double. The pans are made in two grades; smooth, from Wood's refined iron, and polished, from Wellsville polished iron. The following are among the points of excellence claimed for the pan by the manufacturers: That it has coppered steel rods extending



The Never Burn Bread Pan.

along the bottom from end to end, raising the pan from the oven floor and leaving an air space for ventilation; that the air space serves to keep an even heat in the pan and prevents burning on the bottom; that the rods prevent all wear on the bottom of the pan; that the rods cause the pan to slide easily in and out of the oven, no matter how heavy its contents may be; that the handles of the pan stop in a horizontal position when in use, and do not burn the fingers in removing the pan from a hot oven; that nothing can cling to the smooth metal, and that all parts are easy to clean.

The American Water Cooler Stand.

The water cooler stand, herewith illustrated, is offered by the American Can Company, Bowling Green Building, New York, and Chicago. It is constructed so



The American Water Cooler Stand.

that the drip is easily taken care of without disturbing the cooler. The stands are made in two sizes, the small size taking 2, 3 and 4 gallon coolers, and the large size taking 6, 8 and 10 gallon coolers. The stands are decorated to match the coolers.

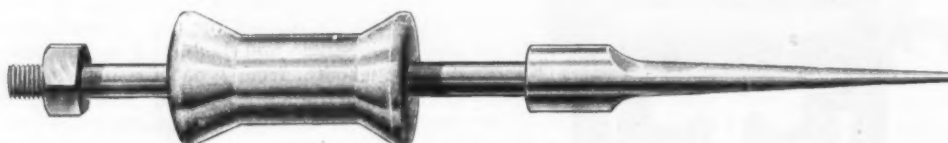
The Modern Drill Drift.

The drill drift shown herewith is offered by the Maria Stein Machine Works, Maria Stein, Ohio. The tool is 15 inches long and the ball or hammer is $2\frac{1}{4}$ inches in diameter at the largest part. Its weight is 4 pounds. The tool is designed for use in connection with a drill press or other machines using taper sockets, for driving out drills that may stick. The key is forged from steel, and the shank is screwed into the keyhead, so that whenever the key needs redressing it may be removed and

arrangement of the ribs of the plates tends to keep the stock from slipping while being sawed. Each box is equipped with saws having 12 points to the inch and is warranted.

The Combination Machine Freezer.

The North Brothers Mfg. Company, American street and Lehigh avenue, Philadelphia, Pa., have put on the market a new power freezer, as shown herewith. It is designed to meet the requirements of manufacturers of



The Modern Drill Drift.

redressed. The shank is made so as to be long enough to let the ball slide on it sufficiently to impart a strong blow on the head of the key, when pushed forcibly against it, to force it into the keyway socket. The ball takes the place of a hammer, cannot get off nor be lost, and is always ready for use. The shank is provided with a hole in the outer end, outside the nut, so that a chain may be attached and the tool chained to some convenient place.

The New Marsh Langdon Miter Boxes.

The New Marsh Langdon and New Marsh Langdon improved miter boxes, herewith illustrated, are offered by H. G. Marsh, Rockford, Ill. Each box is provided with

ice cream who desire to make up different quantities of cream or ices in one machine by use of different sizes of cans and tubs. The illustration represents the machine with a 40-quart can and tub. Smaller sizes are used by having extension pieces or couplings to reach from the gearing to the dasher and can of each 18, 24 and 32 quart sizes. In order to avoid trouble or delay in the adjustment for different sizes of tubs, each one of the smaller tubs is made with an iron band at the bottom, the outside diameter of which is the same as that of the largest tub, so that any of these tubs can

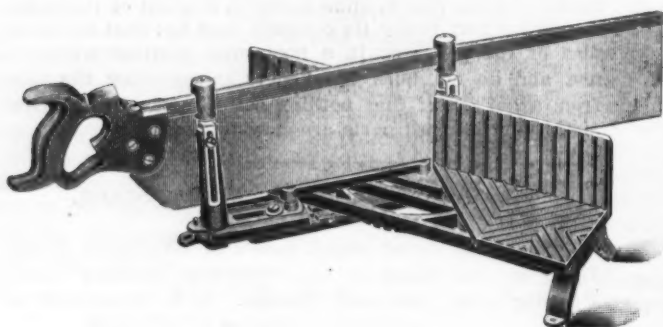


Fig. 1.—The New Marsh Langdon Miter Box.

metal face or bed plates having ground surfaces, and there being no opportunity for warping or splitting off, a true and level bed plate to work from is assured. The



The Combination Machine Freezer.

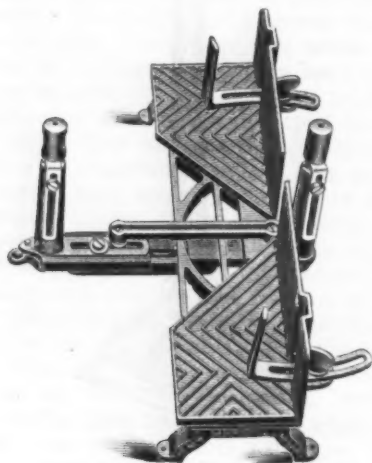


Fig. 2.—The New Marsh Langdon Improved Miter Box.

edges of the plate also are ground, adding to the general appearance of the tool, as well as contributing to trueness and accuracy of work and to durability of the box. The

be put in the machine, pushed up against the stops on the base plate and thus in line with the gearing of the frame. The coupling to connect the gearing to the can has a clutch at each end, one of which engages with the clutch on the lid and the other with the clutch on the lower bevel gear. The shaft of the dasher passes through the coupling and engages with the upper gear. As the upper and lower bevel gears turn in opposite directions the can and dasher will do the same. The arrangement of parts is such that the gearing is never exposed, not even during the change of tubs and cans. The dasher in the can is of the Seaman style, with horizontal beaters, and has metal scrapers on each side and at the bottom. It is pointed out that the machine can be run continuously by taking out one set of tubs and cans and putting in another, transferring the frozen cream to packing cans, and putting a new batch in the machine can ready for freezing, while one batch is being frozen. All parts of the machine are made of standard sizes, so that additional apparatus can be had at any time to fit the freezer.

The Little Giant Ice Chipper.

The Davenport Ice Chipping Machine Company, Davenport, Iowa, are placing on the market the Little Giant Ice Chipper, shown herewith, a machine designed to take the place of hand tools for shaving or chipping ice. The special features of the machine, according to

by the movement of one of the interior systems, and a graduated scale on the tube indicates the different powers. There is said to be a perfect uniformity in point of excellence throughout the scale, each power being equal to the corresponding one listed in the Stevens special series. The tube is $\frac{3}{4}$ -inch diameter and the multiscope is furnished with sliding micrometer mountings, with single or double micrometer as required.



Fig. 1.—The Little Giant Ice Chipper.

the manufacturers, are simplicity, compactness, strength and durability. Brackets are provided for attachment to a wall post or to a portable stand, by bolts or lag screws. The fly wheel has a detachable handle, the spout at the bottom is made to be turned, on the swivel plan, to either side or to any desired position, and the cylinder is of heavy cast iron. Upon the sectional wheels which are firmly attached to the shaft, are mounted toothed blades of tool steel, fastened by heavy machine screws, allowing the blades to be adjusted and easily replaced when necessary.

Stevens' Multiscope.

J. Stevens Arms & Tool Company, Chicopee Falls, Mass., since the acquisition of the rifle telescope business of the Cataract Tool & Optical Company, Buffalo, N. Y., a couple of years ago, have put on the market a number of telescopes for use on their fire arms, such as regular and pocket rifles, pistols, &c., but the particular 'scope wanted had to be determined when ordering. Now, however, they have brought out the Stevens Multiscope, as here illustrated, which is a variable telescope and can be mounted on various arms as desired. This instrument

Egg Carrier and Bottle Holder.

Searls Mfg. Company, 31 Mulberry street, Newark, N. J., manufacturers of bath room specialties, represented by Frederick Klages, 127 Duane street, New York, have

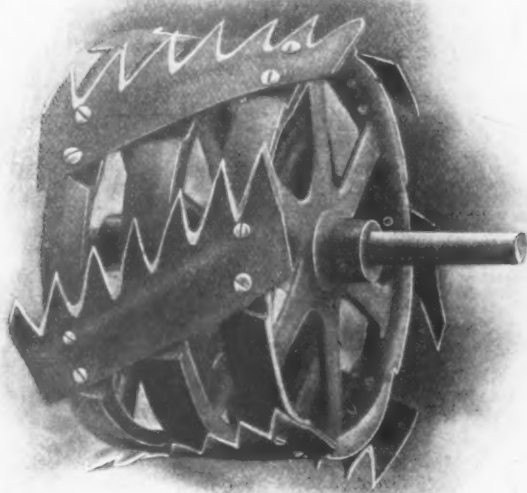


Fig. 2.—Cylinder of Giant Ice Chipper.

recently added a number of new articles to their already extensive assortment of this class of goods, among which are an egg carrier and flexible bottle holder, as here illustrated. The No. 3727 egg carrier, Fig. 1, is made of brass wire, nickel plated, with compartments for holding six eggs, both while being boiled and for carrying the eggs

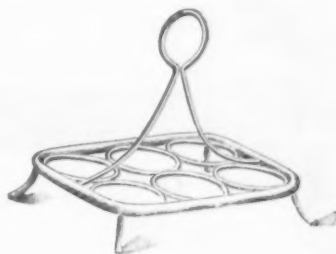


Fig. 1.—Egg Carrier.



Fig. 2.—Flexible Bottle Holder.

to the table when cooked. Fig. 2 illustrates a flexible bottle holder, No. 3763, made of one piece of brass wire and nickel plated. Owing to its peculiar construction it automatically adjusts itself to ordinary sized bottles, but



Stevens' Rifle or Pistol Multiscope.

is seven complete telescopes in one and without the addition of extra lenses. The minimum power is 6 with a maximum of 12 diameters. The change of power is made

is designed particularly for ginger ale and club soda, the holder with its spring like action clinging to the bottle until removed with a little pressure.

Hannah's Cylinder and Red Spout Pumps.

The accompanying illustrations represent cylinder and pumps, being put on the market by the Modern Iron Works, Quincy, Ill. The cylinder, shown in Fig. 1, is made entirely of brass, except the caps. The piston head having two water ways, the company explain that they are able to handle the same amount of water by the connecting tubes from the top of the cylinder as from

placed. The object is to hold a nail for the first blow, after which the holder is slipped away from the nail and it is driven in. Carpenters' Favorite adze eye and adze eye bell face nail hammers are furnished with the nail holder, in size No. 1½.

The Improved Star Coal Hod.

The Fred. T. Brosi Company, Quincy, Ill., are offering corrugated coal hods, as shown in the accompanying cut.



Fig. 1.—Hannah's Double Action Pump Cylinder.

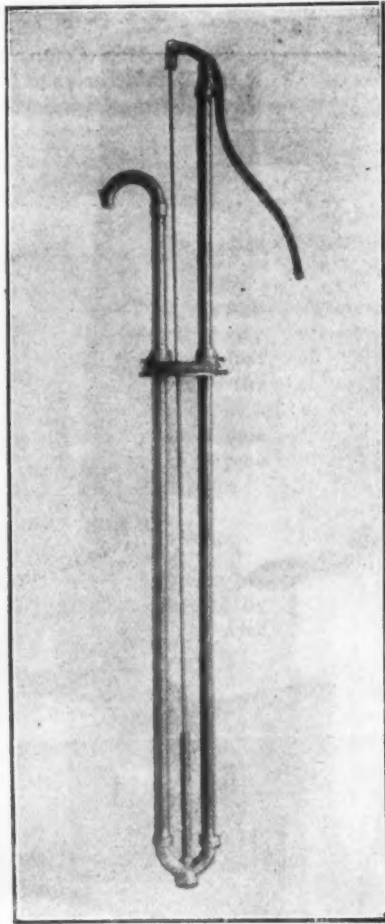


Fig. 2.—Red Spout Pump Standard No. 100.

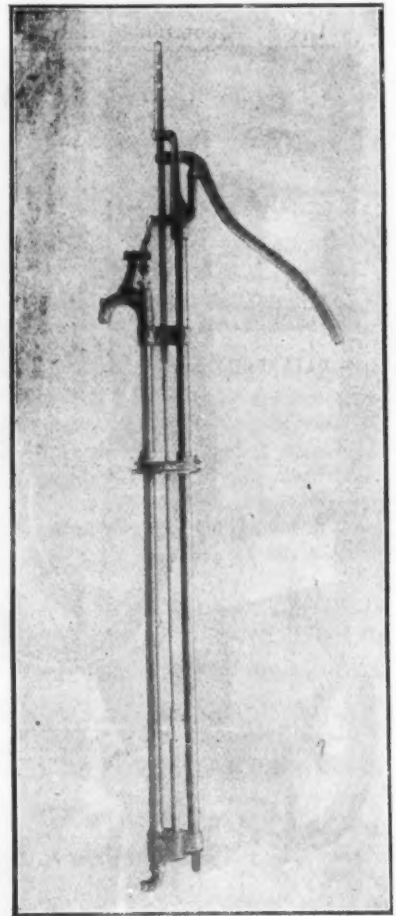


Fig. 3.—Red Spout Pump Standard No. 110.

the bottom, giving double the volume of water of the ordinary cylinder, there being a continuous suction and

The hods are made both funnel and open, japanned and galvanized. They are constructed with a view to making



The Plumb Hammer, with Nail Holder.

discharge. It is pointed out that there is no packing on the piston, and nothing to wear out, and that there is no expense entailed for new leathers. In Figs. 2 and 3 are shown two of the company's pump standards. The discharge and stand pipes on all pumps are 1¼ inches. The platform plates have a collar and set screws for each pipe. The brass packing tube is made of heavy brass and has a double set of packing. All cast parts are made especially heavy.

Plumb Hammer with Nail Holder.

Fayette R. Plumb, Inc., Philadelphia, Pa., are putting on the market the hammer with nail holder, shown here-with. It is fastened to the front of the eye of a nail hammer and consists of a separate piece with a groove running across it into which the head of the nail is

more attractive hods, while increasing the strength by corrugations. It is pointed out that the strength ob-



The Improved Star Coal Hod.

tained by corrugations is equal to an extra heavy coal hod costing a good deal more.

Current Hardware Prices.

REVISED MAY 5, 1903.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33 $\frac{1}{3}$ @ 33 $\frac{1}{3}$ & 10% signifies that the

price of the goods in question ranges from 33 $\frac{1}{3}$ per cent. discount to 33 $\frac{1}{3}$ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued April, 1902, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Abrasives—

Adamite in Carloads: $\frac{1}{2}$ ton \$90@100
Grain $\frac{1}{2}$ ton \$120@140
See also Emery.

Adjusters, Blind—

Dormestic, $\frac{1}{2}$ doz. \$3.00.....33 $\frac{1}{3}$ %
North's.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....25&5%
Taplin's Perfection.....5&5%

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—American—

Armand Hammer, Wrought $\frac{1}{2}$ doz. \$8.50@9.50
Buel Patent Trench..... $\frac{1}{2}$ doz. \$7.50@8.50
Eagle Anvils..... $\frac{1}{2}$ doz. \$7.50@8.50
Hay-Budden, Wrought..... $\frac{1}{2}$ doz. \$7.50@8.50
Horseshoe Brand, Wrought..... $\frac{1}{2}$ doz. \$7.50@8.50

Imported—

Peter Wright & Sons..... $\frac{1}{2}$ doz. \$10.50

Anvil, Vise and Drill—

Millers Falls Co., \$18.00.....10%
See also Parers, Appie, &c.

Apple Parers—See Parers, Appie, &c.

Aprons, Blacksmiths'—

Hull Bros. Co.:
Lots of 1 doz.....25%
Smaller Lots.....30%
Lots of 3 doz.....30%

Augers and Bits—

Com. Double Spur.....70@70¢
Boring Machine Augers.....60@60¢
Car Bits, 12-in. twist.....60@60¢
Jennings' Pattern.....50¢
Auger Bits.....50¢
Ford's Auger and Car Bits.....40%
Forster's Pat. Auger Bits.....35%
C. E. Jennings & Co.:
No. 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 200, 202, 204, 206, 208, 210, 212, 214, 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248, 250, 252, 254, 256, 258, 260, 262, 264, 266, 268, 270, 272, 274, 276, 278, 280, 282, 284, 286, 288, 290, 292, 294, 296, 298, 300, 302, 304, 306, 308, 310, 312, 314, 316, 318, 320, 322, 324, 326, 328, 330, 332, 334, 336, 338, 340, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362, 364, 366, 368, 370, 372, 374, 376, 378, 380, 382, 384, 386, 388, 390, 392, 394, 396, 398, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 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826, 828, 830, 832, 834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872, 874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912, 914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952, 954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992, 994, 996, 998, 1000, 1002, 1004, 1006, 1008, 1010, 1012, 1014, 1016, 1018, 1020, 1022, 1024, 1026, 1028, 1030, 1032, 1034, 1036, 1038, 1040, 1042, 1044, 1046, 1048, 1050, 1052, 1054, 1056, 1058, 1060, 1062, 1064, 1066, 1068, 1070, 1072, 1074, 1076, 1078, 1080, 1082, 1084, 1086, 1088, 1090, 1092, 1094, 1096, 1098, 1100, 1102, 1104, 1106, 1108, 1110, 1112, 1114, 1116, 1118, 1120, 1122, 1124, 1126, 1128, 1130, 1132, 1134, 1136, 1138, 1140, 1142, 1144, 1146, 1148, 1150, 1152, 1154, 1156, 1158, 1160, 1162, 1164, 1166, 1168, 1170, 1172, 1174, 1176, 1178, 1180, 1182, 1184, 1186, 1188, 1190, 1192, 1194, 1196, 1198, 1200, 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220, 1222, 1224, 1226, 1228, 1230, 1232, 1234, 1236, 1238, 1240, 1242, 1244, 1246, 1248, 1250, 1252, 1254, 1256, 1258, 1260, 1262, 1264, 1266, 1268, 1270, 1272, 1274, 1276, 1278, 1280, 1282, 1284, 1286, 1288, 1290, 1292, 1294, 1296, 1298, 1300, 1302, 1304, 1306, 1308, 1310, 1312, 1314, 1316, 1318, 1320, 1322, 1324, 1326, 1328, 1330, 1332, 1334, 1336, 1338, 1340, 1342, 1344, 1346, 1348, 1350, 1352, 1354, 1356, 1358, 1360, 1362, 1364, 1366, 1368, 1370, 1372, 1374, 1376, 1378, 1380, 1382, 1384, 1386, 1388, 1390, 1392, 1394, 1396, 1398, 1400, 1402, 1404, 1406, 1408, 1410, 1412, 1414, 1416, 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434, 1436, 1438, 1440, 1442, 1444, 1446, 1448, 1450, 1452, 1454, 1456, 1458, 1460, 1462, 1464, 1466, 1468, 1470, 1472, 1474, 1476, 1478, 1480, 1482, 1484, 1486, 1488, 1490, 1492, 1494, 1496, 1498, 1500, 1502, 1504, 1506, 1508, 1510, 1512, 1514, 1516, 1518, 1520, 1522, 1524, 1526, 1528, 1530, 1532, 1534, 1536, 1538, 1540, 1542, 1544, 1546, 1548, 1550, 1552, 1554, 1556, 1558, 1560, 1562, 1564, 1566, 1568, 1570, 1572, 1574, 1576, 1578, 1580, 1582, 1584, 1586, 1588, 1590, 1592, 1594, 1596, 1598, 1600, 1602, 1604, 1606, 1608, 1610, 1612, 1614, 1616, 1618, 1620, 1622, 1624, 1626, 1628, 1630, 1632, 1634, 1636, 1638, 1640, 1642, 1644, 1646, 1648, 1650, 1652, 1654, 1656, 1658, 1660, 1662, 1664, 1666, 1668, 1670, 1672, 1674, 1676, 1678, 1680, 1682, 1684, 1686, 1688, 1690, 1692, 1694, 1696, 1698, 1700, 1702, 1704, 1706, 1708, 1710, 1712, 1714, 1716, 1718, 1720, 1722, 1724, 1726, 1728, 1730, 1732, 1734, 1736, 1738, 1740, 1742, 1744, 1746, 1748, 1750, 1752, 1754, 1756, 1758, 1760, 1762, 1764, 1766, 1768, 1770, 1772, 1774, 1776, 1778, 1780, 1782, 1784, 1786, 1788, 1790, 1792, 1794, 1796, 1798, 1800, 1802, 1804, 1806, 1808, 1810, 1812, 1814, 1816, 1818, 1820, 1822, 1824, 1826, 1828, 1830, 1832, 1834, 1836, 1838, 1840, 1842, 1844, 1846, 1848, 1850, 1852, 1854, 1856, 1858, 1860, 1862, 1864, 1866, 1868, 1870, 1872, 1874, 1876, 1878, 1880, 1882, 1884, 1886, 1888, 1890, 1892, 1894, 1896, 1898, 1900, 1902, 1904, 1906, 1908, 1910, 1912, 1914, 1916, 1918, 1920, 1922, 1924, 1926, 1928, 1930, 1932, 1934, 1936, 1938, 1940, 1942, 1944, 1946, 1948, 1950, 1952, 1954, 1956, 1958, 1960, 1962, 1964, 1966, 1968, 1970, 1972, 1974, 1976, 1978, 1980, 1982, 1984, 1986, 1988, 1990, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006, 2008, 2010, 2012, 2014, 2016, 2018, 2020, 2022, 2024, 2026, 2028, 2030, 2032, 2034, 2036, 2038, 2040, 2042, 2044, 2046, 2048, 2050, 2052, 2054, 2056, 2058, 2060, 2062, 2064, 2066, 2068, 2070, 2072, 2074, 2076, 2078, 2080, 2082, 2084, 2086, 2088, 2090, 2092, 2094, 2096, 2098, 2100, 2102, 2104, 2106, 2108, 2110, 2112, 2114, 2116, 2118, 2120, 2122, 2124, 2126, 2128, 2130, 2132, 2134, 2136, 2138, 2140, 2142, 2144, 2146, 2148, 2150, 2152, 2154, 2156, 2158, 2160, 2162, 2164, 2166, 2168, 2170, 2172, 2174, 2176, 2178, 2180, 2182, 2184, 2186, 2188, 2190, 2192, 2194, 2196, 2198, 2200, 2202, 2204, 2206, 2208, 2210, 2212, 2214, 2216, 2218, 2220, 2222, 2224, 2226, 2228, 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244, 2246, 2248, 2250, 2252, 2254, 2256, 2258, 2260, 2262, 2264, 2266, 2268, 2270, 2272, 2274, 2276, 2278, 2280, 2282, 2284, 2286, 2288, 2290, 2292, 2294, 2296, 2298, 2300, 2302, 2304, 2306, 2308, 2310, 2312, 2314, 2316, 2318, 2320, 2322, 2324, 2326, 2328, 2330, 2332, 2334, 2336, 2338, 2340, 2342, 2344, 2346, 2348, 2350, 2352, 2354, 2356, 2358, 2360, 2362, 2364, 2366, 2368, 2370, 2372, 2374, 2376, 2378, 2380, 2382, 2384, 2386, 2388, 2390, 2392, 2394, 2396, 2398, 2400, 2402, 2404, 2406, 2408, 2410, 2412, 2414, 2416, 2418, 2420, 2422, 2424, 2426, 2428, 2430, 2432, 2434, 2436, 2438, 2440, 2442, 2444, 2446, 2448, 2450, 2452, 2454, 2456, 2458, 2460, 2462, 2464, 2466, 2468, 2470, 2472, 2474, 2476, 2478, 2480, 2482, 2484, 2486, 2488, 2490, 2492, 2494, 2496, 2498, 2500, 2502, 2504, 2506, 2508, 2510, 2512, 2514, 2516, 2518, 2520, 2522, 2524, 2526, 2528, 2530, 2532, 2534, 2536, 2538, 2540, 2542, 2544, 2546, 2548, 2550, 2552, 2554, 2556, 2558, 2560, 2562, 2564, 2566, 2568, 2570, 2572, 2574, 2576, 2578, 2580, 2582, 2584, 2586, 2588, 2590, 2592, 2594, 2596, 2598, 2600, 2602, 2604, 2606, 2608, 2610, 2612, 2614, 2616, 2618, 2620, 2622, 2624, 2626, 2628, 2630, 2632, 2634, 2636, 2638, 2640, 2642, 2644, 2646, 2648, 2650, 2652, 2654, 2656, 2658, 2660, 2662, 2664, 2666, 2668, 2670, 2672, 2674, 2676, 2678, 2680, 2682, 2684, 2686, 2688, 2690, 2692, 2694, 2696, 2698, 2700, 2702, 2704, 2706, 2708, 2710, 2712, 2714, 2716, 2718, 2720, 2722, 2724, 2726, 2728, 2730, 2732, 2734, 2736, 2738, 2740, 2742, 2744, 2746, 2748, 2750, 2752, 2754, 2756, 2758, 2760, 2762, 2764, 2766, 2768, 2770, 2772, 2774, 2776, 2778, 2780, 2782, 2784, 2786, 2788, 2790, 2792, 2794, 2796, 2798, 2800, 2802, 2804, 2806, 2808, 2810, 2812, 2814, 2816, 2818, 2820, 2822, 2824, 2826, 2828, 2830, 2832, 2834, 2836, 2838, 2840, 2842, 2844, 2846, 2848, 2850, 2852, 2854, 2856, 2858, 2860, 2862, 2864, 2866, 2868, 2870, 2872, 2874, 2876, 2878, 2880, 2882, 2884, 2886, 2888, 2890, 2892, 2894, 2896, 2898, 2900, 2902, 2904, 2906, 2908, 2910, 2912, 2914, 2916, 2918, 2920, 2922, 2924, 2926, 2928, 2930, 2932, 2934, 2936, 2938, 2940, 2942, 2944, 2946, 2948, 2950, 2952, 2954, 2956, 2958, 2960, 2962, 2964, 2966, 2968, 2970, 2972, 2974, 2976, 2978, 2980, 2982, 2984, 2986, 2988, 2990, 2992, 2994, 2996, 2998, 3000, 3002, 3004, 3006, 3008, 3010, 3012, 3014, 3016, 3018, 3020, 3022, 3024, 3026, 3028, 3030, 3032, 3034, 3036, 3038, 3040, 3042, 3044, 3046, 3048, 3050, 3052, 3054, 3056, 3058, 3060, 3062, 3064, 3066, 3068, 3070, 3072, 3074, 3076, 3078, 3080, 3082, 3084, 3086, 3088, 3090, 3092, 3094, 3096, 3098, 3100, 3102, 3104, 3106, 3108, 3110, 3112, 3114, 3116, 3118, 3120, 3122, 3124, 3126, 3128, 3130, 3132, 3134, 3136, 3138, 3140, 3142, 3144, 3146, 3148, 3150, 3152, 3154, 3156, 3158, 3160, 3162, 3164, 3166, 3168, 3170, 3172, 3174, 3176, 3178, 3180, 3182, 3184, 3186, 3188, 3190, 3192, 3194, 3196, 3198, 3200, 3202, 3204, 3206, 3208, 3210, 3212, 3214, 3216, 3218, 3220, 3222, 3224, 3226, 3228, 3230, 3232, 3234, 3236, 3238, 3240, 3242, 3244, 3246, 3248, 3250, 3252, 3254, 3256, 3258, 3260, 3262, 3264, 3266, 3268, 3270, 3272, 3274, 3276, 3278, 3280, 3282, 3284, 3286, 3288, 3290, 3292, 3294, 3296, 3298, 3300, 3302, 3304, 3306, 3308, 3310, 3312, 3314, 3316, 3318, 3320, 3322, 3324, 3326, 3328, 3330, 3332, 3334, 3336, 3338, 3340, 3342, 3344, 3346, 3348, 3350, 3352, 3354, 3356, 3358, 3360, 3362, 3364, 3366, 3368, 3370, 3372, 3374, 3376, 3378, 3380, 3382, 3384, 3386, 3388, 3390, 3392, 3394, 3396, 3398, 3400, 3402, 3404, 3406, 3408, 3410, 3412, 3414, 3416, 3418, 3420, 3422, 3424, 3426, 3428, 3430, 3432, 3434, 3436, 3438, 3440, 3442, 3444, 3446, 3448, 3450, 3452, 3454, 3456, 3458, 3460, 3462, 3464, 3466, 3468, 3470, 3472, 3474, 3476, 3478, 3480, 3482, 3484, 3486, 3488, 3490, 3492, 3494, 3496, 3498, 3500, 3502, 3504, 3506, 3508, 3510, 3512, 3514, 3516, 3518, 3520, 3522, 3524, 3526, 3528, 3530, 3532, 3534, 3536, 3538, 3540, 3542, 3544, 3546, 3548, 3550, 3552, 3554, 3556, 3558, 3560, 3562, 3564, 3566, 3568, 3570, 3572, 3574, 3576, 3578, 3580, 3582, 3584, 3586, 3588, 3590, 3592, 3594, 3596, 3598, 3600, 3602, 3604, 3606, 3608, 3610, 3612, 3614, 3616, 3618, 3620, 3622, 3624, 3626, 3628, 3630, 3632, 3634

Can Openers—See Openers, Can

Cans, Milk—		
5	8	10 gal.
Illinois Pattern, \$1.50	2.00	2.25 each.
Iowa Pattern,	2.35	2.50 each.
New York Pattern,	2.40	2.75 each.
Baltimore Pattern,	1.80	2.00 each.

Cans, Oil—

Buffalo Family Oil Cans:		
3	5	10 gal.
\$45.00	60.00	120.00 gro

Caps—Perceussion—

Eley's E. B.	60c
G. D.	per M \$2.50
F. L.	per M \$2.00
G. E.	per M \$1.50
Musket	per M \$2.00

Primers—

Erdan Primers, \$1.00 per M.	50c
B. L. Caps (Sturtevant Shell)	\$1.00 per M.
All other primers per M. \$1.25 to \$1.37	

Cartridges—

Blank Cartridges—		
22 C. F. \$5.50	10c	50c
28 C. F. \$7.00	10c	50c
2 cal. Rim, \$1.50	10c	50c
2 cal. Rim, \$2.75	10c	50c
B. B. Caps, Con., Ball Supp.	\$1.00	
B. B. Caps, Round Ball,	\$1.50	
Central Fire	25c	
Target and Sporting Rifle	1c	10c
Primer Shells and Bullets	15c	10c
Rim Fire Sporting	50c	
Rim Fire, Military	15c	50c

Casters—

Bed	70c	70c
Plate	60c	60c
Philadelphia	75c	75c
Boss	70c	10c
Boss Anti-Friction	70c	10c
Martin's Patent (Phoenix)	45c	
Standard Ball Bearing	45c	
Tucker's Patent low list	80c	

Cattle Leaders—

See Leaders, Cattle.

Chain, Coil—

American Coil, Jobbers' Shipments:		
3-16 1/4 4-16 3/4 7-16 3/4 9-16		
8-16 6-16 4-16 3-16 2-16 1-16		
3-16 3-16 3-16 3-16 3-16 3-16		
German Coil	60c	10c

Halters and Ties—

Halter Chains	60c	10c
German Halter Chains, list July 21, '97	60c	10c
Cow Ties	60c	10c

Trace, Wagon, &c.—

Traces, Western Standard: 100 pair		
6-1/2-3, Straight, with ring	\$27.00	
6-1/2-3, Straight, with ring	\$23.00	
6-1/2-3, Straight, with ring	\$23.00	
6-1/2-3, Straight, with ring	\$27.00	
add 2c per pair for Hooks.		
Truck Traces 2c per pair higher than		
Straight Link.		
Trace, Wagon and Fancy Chains	60c	10c

Miscellaneous—

Jack Chain, list July 10, '93:		
Iron	60c	10c
Brass	60c	10c
Safety Chain	70c	10c
Gal. Pump Chain	40c	10c
Covert Mfg. Co.		
Breast	40c	25c
Breast	40c	25c
Heel	40c	25c
Heel	40c	25c
Stallion	40c	25c

Covert Saddle Works:

Breast	70c
Halter	70c
Old Back	70c
Rein	70c
Onelda C. m. n. l. y.	40c
Am. C. H. and Halters	40c
Am. Cow Ties	40c
Eureka Coil and Halters	40c
Niagara Coil and Halters	40c
Niagara Cow Ties	40c
Wire Dog Chains	40c
Wire Goods Co.	70c
Dog Chain	70c
Universal Dbi-Joint Chain	50c

Chalk—(From Jobbers.)

Carpenters' Blue	40c	10c
Carpenters' Red	40c	10c
Carpenters' White	40c	10c
See also Crayons.		

Checks, Poor—

Bardsley's	40c	10c
Columbia	50c	10c
Eclipse	60c	

Chests, Tool—

American Tool Chest Co.:		
Boys' Chests, with Tools	55c	
Youth's Chests, with Tools	40c	
Gentlemen's Chests, with Tools	30c	
Farmers' Chests, etc., Chests	30c	
Mechanists' and F. J. P. litters' Chests	30c	
C. F. Jennings & Co.'s Mechanists' Tool Chests	30c	

Chisels—

Socket Framing and Firmer		
Standard List	70c	10c
Buck Bros	30c	
Charles Buck	30c	
C. E. Jennings & Co. Socket Firmer No. 10	60c	10c
C. E. Jennings & Co. Socket Framing No. 13	60c	10c
Swan's	70c	
L. & I. J. White	30c	10c

Tanged—

Tanged Firmers	40c	10c
Buck Bros	30c	
Charles Buck	30c	

C. E. Jennings & Co. Nos. 191, 181.

L. & I. J. White, Tanged

Cold—

Cold Chisels, good quality, lb. 13c to 15c	
Cold Chisels, fair quality, lb. 11c to 12c	
Cold Chisels, ordinary, lb. 8c to 10c	

Chucks—

Beach Patent each \$8.00.....	35c	50
Pratt's Positive Drive.....	25c	50
Empire.....	25c	50
Blacksmiths'.....	25c	50
Skinner Patent Chucks:		
Combination Lathe Chucks.....	40c	50
Drill Chucks, Patent and Standard.....	25c	50
Drill Chucks, New Model.....	25c	50
Independent Lathe Chucks.....	40c	50
Improved Planer Chucks.....	25c	50
Universal Lathe Chucks.....	40c	50
Face Plate Jaws.....	40c	50
Standard Tool Co.:		
Improved Drill Chuck.....	45c	50
Union Mfg. Co.:		
Combination.....	40c	50
Car Drill.....	30c	50
Geared Scroll.....	30c	50
Independent.....	40c	50
Union Drill.....	40c	50
Universal.....	40c	50
Face Plate Jaws.....	30c	50
Wescott Patent Chucks:		
Lathe Chucks.....	50c	50
Little Giant Auxiliary Drill.....	40c	50
Little Giant Double Grip Drill.....	40c	50
Little Giant Drill, Improved.....	40c	50
One da Drill.....	40c	50
Scroll Combination Lathe.....	40c	50

Ciamps—

Adjustable, Hammers'	20c	20c
Cabinet Sargent's	50c	10c
Carriage Makers' P. S. & W. Co.	50c	
Carriage Makers' Sargent's	60c	
Beary, Parallel	33c	10c
Linemans, Ulica Drop Forge & Tool Co.	40c	
Saw Clamps, see Vises, Saw Files.		

Cleaners, Drain—

Iwan's Champion, Adjustable	55c
Iwan's Champion, Stationary	40c

Sidewalk—

Star Socket, All Steel	\$4.05	net
Star Shank, All Steel	\$3.24	net
W. & C. Shank, All steel, 7 1/2 in. ...	\$3.05	
8 in. ...	\$3.10	
8 1/2 in. ...	\$3.25	

Cleavers, Butchers'—

Foster Bros.....	30%
New Haves Edge Tool Co.'s.....	45%
Fayette R. Plumb... ..	33 1/4@39 1/4& 10%
P. S. & W.....	50@50&5%
L. & I. J. White.....	30%

Clippers—

Chicago Flexible Shaft Company:		
'93 Calico horse	\$8.75	
1902 Chicago Horse	\$10.75	
Lightning Belt	\$15.00	
Chicago Belt	\$20.00	
Stewart's Patent Sheep	\$18.50	

Clips Axle—

Eagle and Superior 1/4 and 5-16		
inch	70c	10c
Norway, 1/2 and 5-16 inch	70c	10c

Cloth and Netting, Wire

—See Wire, &c.

Cocks, Brass—

Hardware List:		
Compression and Plain Bibbs	65c	10c
Globe, Kerosene, Racking, &c.	65c	10c
Cocks	65c	10c

Coffee Mills—See Mills, Coffee.**Collars Dog—**

Brass, W. Alter B. Stevens & Son's list. 40c		
Embo, e. l. Gilt, Walter B. Stevens & Son's list. 40c		
Leat. or Walter B. Stevens & Son's list. 40c		

Combs Mane and Tail—

Covert's Saddlery Works	60c	10c
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Compasses Dividers, &c

Ordinary Goods		
Bemis & Call Hdw. & Tool Co.	75c	75c
Dividers		
Calipers, Call's Patent Inside	85c	
Calipers, Double	85c	
Calipers, Inside or Outside	85c	
Calipers, Wing	85c	
Compasses	50c	
J. Stevens A. & T. Co.	35c	10c

Compressors Corn Shock—

J. B. Hughes' # doz.	\$2.50	
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Conductor Pipe, Galva.—

L. C. L. to Dealers:		
Territory	Noted	Not noted.
Eastern	75c	75c
Central	75c	75c
Southern	75c	75c
S. Western	75c	75c
Terms: \$5 for cash, with delivery on full crates.		
See also Eave Troughs.		

Coolers, Water—

Gal. each. 1 2 3 4 6 8		
Labrador \$1.20 \$1.50 \$1.80 \$2.10 2.70		
Iceland, ea. \$1.80 \$2.10 \$2.40 \$3.00		
Gal. v. Lined Ea. \$1.85 \$2.00 \$2.25 \$2.50 \$3.00		
Gal. v. Lined side handles		
Gal. 2 3 4 6 8		
Each. \$1.95 \$2.15 \$2.40 \$3.00 \$1.15, 25c		

Coopers' Tools—

See Tools, Coopers'.

Cord—

Sash—		
Braided, Drab	1b.	25c
Braided, White, Com.	1b.	17c
Cable Laid Italian, lb. A. Isc, B. Isc		
Common Laid	1b.	9c
Cotton Laid Cord, Twisted	1b.	10c
Patent Russia	1b.	10c
Cable Laid Russia	1b.	10c
India Hemp, Braided	1b.	10c
India Hemp, Twisted	1b.	10c
Patent India, Twisted	1b.	10c

Anniston Cordage Co.:		
Old Glory, Nos. 7 to 12	24c	
Anniston, Nos. 7 to 12	19c	
Old Colony, Nos. 7 to 12	19c	
Anniston Drab, Nos. 7 to 12	24c	
Pearl Braided, cotton	17c	
Massachusetts, White	22c	
Massachusetts, Drab	22c	
Eddystone Braided Cotton	19c	
Harmony Cable Laid Italian	18c	
Ossawa Mills:		
Crown, Solid Braided White	22c	
Braided, Galv. White	20c	
Peerless	10c	
Cable Laid Italian	10c	
Cable Laid Russian	14c	
Cable Laid India	12c	
Braided India	18c	
Phoenix, White	19c	
Samson, Nos. 7 to 12	32c	
Braided, Arab Cotton	32c	
Braided, Italian Hemp	42c	
Braided, Liten	42c	
Braided, White Cotton, Spot	28c	
No. 6, 6000, 1c extra.		
Silver Lake:		
A quality, Drab, 40c	15c	
A quality, White, 35c	15c	
B quality, Drab, 35c	15c	
B quality, White, 30c	15c	
Italian Hemp, 40c	15c	
Linen, 57c	15c	

Wire, Picture—

List Oct., '00	85c	10c
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Crackers, Nut—

Little Giant	gr.	\$24.00
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Cradles—

Grain	50c	
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Crayons—

White Round Crayons, gross 5 1/2 @ 6c		
Cases, 100 gr. \$4.50, at factory.		
D. M. Steward Mfg. Co.		
Al Workers' Crayons, gr. \$2.50		
Sopstone Pencils, round, flat		
or square	gr.	\$1.50
Rolling Mill Crayons	gr.	\$2.50
Railroad Crayons (composition) gr. \$2.00		
See also Chalk.		

Crooks, Shepherds'—

Fort Madison, Heavy	\$7.00	
Fort Madison, Light	\$6.50	

Crow Bars—See Bars, Crow.**Cultivators—**

Victor Garden	50c	
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Cutlery, Table—

International Silver Company:		
No. 12 Medium Knives, 1817	\$3.50	doz.
Star, Eagle, Rogers & Hamilton and Anchor	\$3.00	doz.
W. H. Rogers & Son	\$3.50	doz.
Simeon L. & Geo. H. Rogers Company:		
12 dwt. Medium Knives	\$5.00	doz.
No. 7 Medium Knives	\$2.50	doz.

Cutters—Glass—

H. B. Mayhew Co.	40c	
Red Devil	50c	
Smith & Hemenway Co.	50c	
Woodward	40c	

Meat and Food—

Hale's, Nos. 11 & 111 12 & 112 13 & 113		
Per doz.	\$5.00	10.75 14.

Forks—Aug. 1, 1893, list.
 Hay, 3 tine.....60¢
 Hay, 3 tine.....60¢
 Hay, 4 tine.....60¢
 Hay, Header and Baler 3 tine
 6¢15¢
 Hay, Header and Baler, 4 tine
 6¢15¢
 Grain or Barley.....70¢
 Manure, 4 tine.....60¢
 Manure, 5 and 6 tine.....60¢
 Spading.....70¢

Iowa Dig-day Potato.....85¢
 Victor, Hay.....60¢
 Victor, Manure.....60¢
 Victor, Header.....60¢
 Champion, Hay.....60¢
 Champion, Manure.....60¢
 Columbia, Hay.....60¢
 Columbia, Manure.....70¢
 Columbia, Spading.....70¢
 Hawkeye Wood Barley 4 tine # doz.
 \$5.00; 6 tine, \$6.00.
 W. & C. Potato Digger.....65¢
 Acme H. Y., 4 tine.....60¢
 Acme Manure, 4 tine.....60¢
 Acme Manure, 6 tine.....60¢
 Dakota Header.....50¢
 Jackson Steel Header.....50¢
 Kansas Header.....50¢
 W. & C. Favorite Wood Barley 4 tine,
 # doz., \$5.00; 6 tine, \$6.00.
 Pated.—See Spoons.

Frames—Saw—
 Red, Polished and Varished, doz.,
 \$1.15; 4 doz., \$7.00.
 White.....doz. 75¢

Freezers Ice Cream—
 Qts. 2 3 4 5 6 8 10
 Best \$1.25 1.50 1.75 2.00 2.25 2.50 2.75
 Good \$1.25 1.50 1.75 2.00 2.25 2.50 2.75
 Fair \$1.00 1.10 1.30 1.50 1.75 2.00 2.25

Fruit and Jelly Presses—
 See Presses, Fruit and Jelly.

Fry Pans—See Pans, Fry.

Fuse— Per 1000 Feet.
 Temp Fuse.....\$2.60
 Cotton Fuse.....2.90
 Single Taped Fuse.....3.25
 Double Taped Fuse.....3.50
 Triple Taped Fuse.....5.00

Gates, Molasses and Oil—
 Stobbins' Pattern.....80¢

Gauges—
 Marking, Mortise, etc.....50¢

Chapin-Stephens Co.
 Marking, Mortise, etc. 50¢ 10¢ 50¢ 10¢ 10¢
 Scholl's Patent.....50¢
 Door Hangers.....50¢
 Fulton's Butt Gauge.....50¢
 Stanley R. & L. Co.'s Butt & Bahnet
 Gauge.....50¢
 Wire, Brown & Sharpe's.....50¢
 Wire, Morse's.....50¢
 Wire P. S. & W. Co.....50¢

Cimlets—Single Cut—
 Nail, Metal, Assorted, gro. \$1.50; 1.60
 Spike, Metal, Assorted, gro. \$2.80; 3.25
 Nail, Wood Handled, Assorted,
 gro. \$1.75; 2.00
 Spike, Wood Handled, Assorted,
 gro. \$3.25; 3.50

Glass, American Window
 Jobbers' List, Dec. 16, 1902.
 From store, Single and Double 90¢ 10¢
 F. O. B. factory, carload lots:
 Single and Double.....90¢
 2000 box lots.....90¢

Glasses, Level—
 Chapin-Stephens Co., 50¢ 10¢ 10¢ 10¢
 Glue—Liquid, Fish—

List A, Bottles or Cans, with Brush.
 37¢ 1/2 doz. 50¢
 List B, Cans (1/2 gal., pails, etc.) 33¢ 1/2 doz. 45¢
 List C, Cans (1/2 gal., pails, etc.) 25¢ 1/2 doz. 45¢
 International Glue Co. (Martin's)
 40¢ 10¢ 50¢

Grease, Axle—
 Common Grade.....gro. \$5.00; 6.00
 Dixon's Everlasting.....10¢ pails, ea. 85¢
 Dixon's Everlasting, in bxs., # doz. 1 lb.
 \$1.30; 2 lb. \$2.00

Griddles, Soapstone—
 Pike Mfg. Co.....39¢ 33¢ 1/2 10¢

Grindstones—
 Bicycle Grinder.....80.50
 Bicycle Grindstones, each.....\$2.50; 3.00
 Pike Mfg. Co.
 Improved Family Grindstones,
 per inch, per doz.....\$2.00; 3.00
 Pike Mower Knife and Tool
 Grinder, each.....\$9.00
 Vexor Ball Bearing, mounted, Angle
 Iron Frames.....each, \$3.25

Guards, Snow—
 Cleveland Wire Spring Co.:
 Galv. Steel # 1000.....\$9.00
 Copper # 1000.....\$18.00

Halters and Ties—
 Covert Mfg. Co.:
 Web.....45¢
 Jute Rope.....40¢
 Sisal Rope.....20¢
 Covert's Saddlery Works:
 Web and Leather Halters.....70¢
 Jute and Manila Rope Halters.....70¢
 Sisal Rope Halters.....60¢
 Jute, Manila and Cotton Rope Ties.....70¢
 Sisal Rope Ties.....60¢

Hammers—
 Handled Hammers—
 Heller's Machinists'.....40¢ 10¢ 40¢ 10¢
 Heller's Farriers'.....40¢ 10¢ 40¢ 10¢
 Magnetto Tack, Nos. 1, 2, 3, \$1.25, \$1.50,
 \$1.75.....40¢ 10¢ 40¢ 10¢
 Peck, Stow & Wilcox.....50¢
 Fayette B. Plumb:
 Plumb, A. E. Nail, 3 1/2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 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1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1027, 1028, 1029, 1030, 1031, 1032, 1033, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043, 1044, 1045, 1046, 1047, 1048, 1049, 1050, 1051, 1052, 1053, 1054, 1055, 1056, 1057, 1058, 1059, 1060, 1061, 1062, 1063, 1064, 1065, 1066, 1067, 1068, 1069, 1070, 1071, 1072, 1073, 1074, 1075, 1076, 1077, 1078, 1079, 1080, 1081, 1082, 1083, 1084, 1085, 1086, 1087, 1088, 1089, 1090, 1091, 1092, 1093, 1094, 1095, 1096, 1097, 1098, 1099, 1100, 1101, 1102, 1103, 1104, 1105, 1106, 1107, 1108, 1109, 1110, 1111, 1112, 1113, 1114, 1115, 1116, 1117, 1118, 1119, 1120, 1121, 1122, 1123, 1124, 1125, 1126, 1127, 1128, 1129, 1130, 1131, 1132, 1133, 1134, 1135, 1136, 1137, 1138, 1139, 1140, 1141, 1142, 1143, 1144, 1145, 1146, 1147, 1148, 1149, 1150, 1151, 1152, 1153, 1154, 1155, 1156, 1157, 1158, 1159, 1160, 1161, 1162, 1163, 1164, 1165, 1166, 1167, 1168, 1169, 1170, 1171, 1172, 1173, 1174, 1175, 1176, 1177, 1178, 1179, 1180, 1181, 1182, 1183, 1184, 1185, 1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 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1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781,

Wire Coat and Hat:
Acme.....60¢
B. B.60¢
V Brace, Chief and Chief.....60¢
Gem.....60¢
Bright Wire Goods—See Wire.

Wrought Iron—
Box, 6 in., per doz. \$1.00; 8 in., \$1.25;
10 in., \$2.50.
Cotton.....doz. \$1.05@1.25
Wrought Staples, Hooks, &c.—
See Wrought Goods.

Miscellaneous—
Bush, Light, doz. \$5.50; Medium,
\$6.00; Heavy, \$6.50
Grass.....Nos. 1 2 3 4
Best.....\$1.50 1.75 2.00
Common.....\$1.30 1.50 1.60 1.80
Potato and Manure.....66¢@70¢
Whiffletree.....lb. 5¢
Hocks and Eyes:
Brass.....60¢@10¢@70¢
Malleable Iron.....70¢@70¢@10¢
Covert Saddlery Works' Self Locking
Gate and Door Hook.....60¢
Ft. Madison Cut-Down Corn Hook,
per doz. \$5.35 net
Crown Picture.....50¢@10¢
Bench Hooks—See Bench Stops.
Corn Hooks—See Knives, Corn.

Horse Nails—See Nails, Horse
Horseshoes—
See Shoes, Horse.
Hose Rubber—
Garden Hose, 3/4-inch:
Competition.....ft. 4 1/4 @ 4 1/4
3-ply Standard.....ft. 6 @ 6 1/4
4-ply Standard.....ft. 7 1/4 @ 8 c
3-ply extra.....ft. 8 1/4 @ 9 c
4-ply extra.....ft. 10 1/4 @ 11 c
Cotton Garden, 3/4-inch, coupled:
Low Grade.....ft. 6 @ 7 c
Fair quality.....ft. 8 @ 9 c

Irons— Sad—
From 1 to 10.....lb. 3 1/4 @ 3 c
B. B. Sad Irons.....lb. 3 @ 3 1/4 c
Chinese Laundry.....lb. 4 1/4 @ 5 c
Chinese Sad.....lb. 3 1/4 @ 4 c
Mrs. Potts', per set:
Nos. 50 55 60 65
Jap'd Tops.....7 1/2 7 1/2 8 1/2 8 1/2
Tin'd Tops.....7 1/2 7 1/2 8 1/2 8 1/2
New England Pressing, lb., 3 1/4 @ 3 1/4 c
Pinking—
Pinking Irons.....doz. 50 @ 60 c
Soldering—
Soldering Coppers 3/4 and 3/8.....18 @ 19
1 1/2 and 2.....20 @ 21 c
Covert Mfg. Co.....20 @ 22 c
Jacks, Wagon—
Covert Mfg. Co.:
Auto Screw.....30 @ 5 c
Steel.....55 @ 2 c
Covert's Saddlery Works':
Daisy.....60 @ 10 c
Victor.....60 @ 10 c
Lockport.....50 @ 10 c
Lane's Steel.....30 @ 10 c
Kettles—
Brass, Spun, Plain.....20 @ 25 c
Enameled and Cast Iron—See Ware, Hollow.

Knives—
Butcher, Kitchen, &c.—
Foster Bros. Butcher, &c.....30 c
Hartzell Cutlery Co.....50 c
Smith & Hemenway.....40 @ 10 c
Hay and Straw—See Hay Knives.
Corn—
Withington Acme, per doz., \$2.65; Dent,
\$2.75; Adj. Serrated, \$2.20; Serrated,
\$2.10; Yankee No. 1, \$1.50;
Yankee No. 2, \$1.15.
Drawing—
Standard List.....70 @ 5 @ 70 @ 10 c
Bradley's.....70 @ 5 @ 70 @ 10 c
C. E. Jennings & Co. Nos. 45, 46, 60 @ 10 c
Jennings & Griffin, Nos. 51, 52, 60 @ 10 c
Swan's.....70 @ 10 @ 70 @ 10 c
Watrous.....10 @ 10 @ 10 c
L. & J. White.....20 @ 5 @ 20 @ 5 c
Hay and Straw—
Lightning.....per doz. \$6.50 @ 7.00
Iwan's Sickle Edge.....per doz. \$10.00
Iwan's Serrated.....per doz. \$10.00
Maine.....per doz. \$8.50
Mincing—
Buffalo.....per gro. \$13.00
Miscellaneous—
Farriers.....per doz. \$3.00 @ 5.00
Wostenholm's.....per doz. \$3.00 @ 3.25
Knobs—
Base, 3/4-inch, Birch, or Maple,
Rubber tip, gro.....\$1.10 @ 1.20
Carriage, Jap. all sizes, gro. 25 @ 30 c
Door, Mineral.....doz. 65 @ 70 c
Door, Por. Jap'd.....doz. 70 @ 75 c
Door, Por. Nickel.....doz. \$2.05 @ 2.15
Bardley's Wood Door, Shutter, &c., 1 1/2
Picture, Sargent's.....60 @ 10 c
Lacing Leather—
See Belting Leather.
Ladders Step Etc.—
Lane's Store.....25 c
Myers Noiseless Store Ladders.....50 c
Ladles— Melting—
L. & U. Mfg. Co.....25 c
P. S. & W.....50 c
Reading.....60 c
Sargent's.....45 @ 10 c
Lanterns— Tubular—
Regular Tubular No. 9, doz. \$1.25 @ 1.75
Lift Tubular, No. 0, doz. \$1.75 @ 2.25
Hinge Tubular, No. 0, doz. \$1.75 @ 2.25
Other Styles.....lb. 10 @ 10 c @ 10 c
Bull's Eye Police—
No. 1, 3 1/4 inch.....\$2.50 @ 2.75
No. 2, 3 inch.....\$2.75 @ 3.00

Latches— Gate—
Hoffman's Safety Gate.....per doz. 60 c
Thumb—
Roggin's Latches, with screw, doz. \$5 @ 50 c
Leaders— Cattle—
Small.....doz. 55 c; large, 60 c
Covert Mfg. Co.....45 @ 2 c
Lifters, Transom—
R. & C.....33 @ 2 c
Lines—
Wire Clothes, Nos. 18 19 20
100 feet.....\$2.20 2.00 1.65
75 feet.....\$1.80 1.70 1.50
Osawan Mills.
Crown Solid Braided Chalk.....33 @ 2 c
Mason's, No. 0 to No. 5.....33 @ 2 c
Samson Cordage Works:
Solid Braided Chalk, No. 0 to 3.....40 c
Silver Lake Braided Chalk, No. 0, 60, 100;
No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.50;
per gr.....30 c
Anniston Waterproof Clothes, 50 ft.,
gro. \$22.00; Gilt Edge, \$30.00; Air Line,
\$30.00; Acme, \$15.00; Alabama, \$15.00;
Empire, \$15.50; Advance, \$15.50; Al-
lison, \$11.50; Calhoun, \$10.00; Orloie,
\$20.00; Albermarle, \$25.50; Eclipse,
\$11.00; Chicago, \$10.00; Standard,
\$9.00; Columbia, \$8.00.

Locks— Cabinet—
Cabinet Locks.....33 @ 2 c @ 33 @ 2 c
Door Locks, Latches, &c.—
[Net prices are very often made on
these goods.]
Reading Hardware Co.....50 c
R. & E. Mfg. Co.....70 @ 10 @ 70 @ 10 c
Sargent & Co.....40 @ 10 @ 40 @ 10 c
Elevator—
Stowell's.....40 c
Padlocks—
Wrought Iron.....75 @ 10 @ 75 @ 10 c
R. & E. Mfg. Co. Wrt Steel and Brass.....75 @ 10 @ 75 @ 10 c
Sash, &c.—
Ives' Patent.....55 @ 7 1/2 c
Bronze and Brass.....55 @ 7 1/2 c
Iron.....60 @ 2 1/2 c
Wrought Bronze and Brass.....50 @ 5 c
Wrought Steel.....55 c
Reading.....60 @ 10 @ 60 @ 10 c @ 70 c

Machines— Boring—
Com., Upright, Without Augers.....\$2.00
Com., Angular, Without Augers.....\$2.25
Without Augers.
R. & E. Mfg. Co., Upright, Angular.
Improved No. 3, \$4.25 No. 1, \$5.00
Improved No. 4, \$4.75 No. 2, \$5.38
Improved No. 5, 2.75 No. 3, 3.38
Jennings', No. 4, 3.75 No. 1, 6.50
Miller's Falls.....5.75
Snell's, Rice's Pat. 2.50 2.75
Holisting—
Moore's Anti-Friction Differential Pul-
ley Block.....30 c
Moore's Hand Holist, with Lock Brake.....30 c
Moore's Portable Pneumatic Holist.....25 c
Ice Cutting—
Chandler's.....15 @ 10 c
Washing—
Boss Washing Machine Co.: Per doz.
Boss No. 1; Boss Rotary.....\$57.00
Boss No. 7; Dietz Rotary.....\$60.00
Champion Rotary, Banner No. 1.....\$54.00
Standard Champion No. 1.....\$54.00
Standard Perfection.....\$26.00
Cinti Square Western.....\$30.00
Unedda American, Rotind.....\$29.00
Mallets—
Hickory.....45 @ 5 @ 50 c
Lignumvite.....50 @ 5 @ 50 c
Tanner's, Hickory and Applewood,
doz.....50 @ 50 c
Mat— Door—
Elastic Steel (W. G. Co.).....10 c
Mattocks—
See Picks and Mattocks.
Menders— Hose
Robinson's Hose Menders.....per gro. \$2.00
Milk Cans— See Cans, Milk
Mills— Coffee, etc.—
Enterprise Mfg. Co.....25 @ 30 c
Hoffman's Sift, Coffee and Spice.....
doz.....50 @ 50 c
National, list Jan. 1, '04.....30 c
Parker's Columbia & Victoria, 50 @ 10 @ 60 c
Parker's Box and Side.....50 @ 10 @ 60 c
Swift, Lane Bros Co.....30 c
Mowers, Lawn—
Net prices are generally quoted.
Cheap.....all sizes. \$1.50 @ 1.95
Good.....all sizes. \$2.25 @ 2.50
10 12 14 16-inch
High Grade 4.25 4.50 4.75 5.00
Continental.....60 @ 10 c
Great American.....7 c
Quaker City.....60 @ 10 c
Pennsylvania.....70 c
Penn. Ivania Ball Bearing.....60 @ 5 c
Pennsylvania Golf.....50 c
Pennsylvania Horse.....40 c
Philadelphia.....45 c
Sty. M. S. C. K. T.....70 @ 10 c
Style A, all Steel.....60 @ 10 c
Style E, High Wheel.....70 @ 10 c
Drexel and Gold Coin, low list.....50 @ 5 c
Nails—
Cut and Wire. See Trade Report.
Wire Nail and Brads, Papered.
List July 20, 1899.
85¢ 10¢ 10¢ 55¢ 10¢ 10¢ 10¢
Hungarian, Finishing, Upholster-
ers, &c. See Tacks.

Putnam
Cold Roll'd 10¢ 18¢ 17¢ 16¢10 @ 10 c
American, Nos. 5 to 10 per lb. 9 @ 10 c
Neponset.....Nov. 5 to 10¢ per lb. 12¢
Jobbers' special brands.....per lb. 8 @ 9 c
Picture
1 1/2 2 3 1/2 3 1/2 in.
Brass Head. 45 60 70 95 1.00 gro.
Por. Head.....1.10 1.10 1.10
Crown Picture Nails.....per gro. \$1.50
Nippers, See Pliers and Nippers.
Nuts—
Cold Punched: Off list.
Mfrs. or U. S. Standard.
Square, plain.....\$1.50
Hexagon, plain.....\$1.50
Square, C. T. & R.....\$1.70
Hexagon, C. T. & R.....\$1.70
Hot Pressed:
Mfrs. U. S. or Nar. Gauge Stand.
Square Blank.....\$4.50
Hexagon Blank.....\$5.00
Square Tapped.....\$4.60
Hexagon Tapped.....\$4.80
Oakum—
Best or Government.....lb. 6 1/4 c
Navy.....lb. 4 1/4 c
U. S. Navy.....lb. 5 1/4 c
Plumbers' Spun Oakum.....2 1/4 c
In carload lots 1/4 lb. off f.o.b. New
York.

Oil Tanks—See Tanks, Oil.
Oilers—
Brass and Copper.....65 @ 65 @ 10 c
Tin or Steel.....70 @ 10 @ 75 c
Zinc.....75 @ 75 @ 10 c
Chas. or Paragon:
Brass and Copper.....65 @ 65 @ 10 c
Tin or Steel.....75 @ 75 @ 10 c
Zinc.....75 @ 75 @ 10 c
Malleable, Hammers' Improved, No. 1,
\$3.60; No. 2, \$4.40; No. 3, \$4.40 per doz.
Malleable, Hammers' Old Pattern,
same list.....50 @ 10 c
Ame. I. n T. & Stamping Co.:
Spring Bottom Cans.....70 @ 70 @ 10 c
Railroad Oilers etc.....60 @ 60 @ 10 c
Openers— Can—
French.....doz. 35 c
Iron Handle.....doz. 25 @ 7 c
Sprague, Iron Hide.....per doz. 35 @ 40 c
Sardine Scissors.....doz. \$1.75 @ \$3.00
Marvel.....per doz. \$1.25
National.....50 c
Stowell's.....per doz. 35 @ 45 c
Tip Top.....per doz. 30 @ 75 c
Egg—
Nickel Plate.....per doz. \$2.25
Silver Plate.....per doz. \$3.50
Packing—
Asbestos Packing, Wick and Rope,
L @ 15¢ lb.
Rubber—
Sheet, C. I.....8 @ 12 c
Sheet, C. I.....9 @ 13 c
Sheet, C. B. S.....10 @ 14 c
Sheet, Pure Gum.....50 @ 70 c
Sheet, Red.....55 @ 40 c
Jenkins' Standard, 1/2 @ 80¢.....25 @ 25 @ 5 c
Miscellaneous—
American Packing.....7 @ 10 c lb.
Cotton Packing.....15 @ 15 c lb.
Italian Packing.....9 @ 15 c lb.
Jute.....3 1/4 @ 5 c lb.
Russia Packing.....7 @ 11 c lb.
Pails— Creamery
S. S. & Co., with gauges.. No 1 \$6.25;
No. 2, \$4.50 per doz.
Galvanized—
Price per doz.
Quart.....10 12 14
Water, Regular.....1.75 2.00 2.25
Water, Heavy.....2.75 3.00 3.25
Fire, Rd. Bottom. 2.30 2.60 2.90
Well.....2.25 2.50 2.75
Pans— Dripping—
Standard List.....60 @ 5 @ 60 @ 10 c
Fry—
Common Lipped:
No. 1 2 3 4 5
Per doz. \$0.95 1.05 1.15 1.30 1.65
Roasting and Baking—
Regal, S. S. & Co., per doz. Nos. 5, \$4.50;
10 \$5.25; 20 \$5.75; 30 \$6.25.
Simplex, per doz.:
No. 40 50 60 140 150 160
\$2.75 3.25 3.75 3.00 3.25 4.00
Paper—Building Paper—
Asbestos: lb.
Building Felt.....23 c
Mill Board, sheet, 40 x 40 inches 34 c
Mill Board, roll, thicker than 1-16
inch.....34 c
Mill Board, roll, 1-16 in. thick and
less.....24 c
Per roll
Rosa Sized Sheathing: 500 sq. ft.
Light wt., 25 lbs. to roll, \$0.45 @ 0.50
Medium wt., 35 lbs. to roll, \$0.55 @ 0.65
Heavy wt., 40 lbs. to roll, \$0.65 @ 0.75
Black Water Proof Sheathing, 500
sq. ft., 1 ply, 6c; 2 ply, 8c; 3
ply, \$1.10; 4 ply, \$1.25.
Deafening Felt, 9, 6 and 4 1/2 sq. ft.
to lb., to roll.....\$4.00
Red Rope Roofing, 250 sq. feet per
roll.....\$1.65
NOTE—These goods are often sold at
delivered prices.
Tarred Paper.
1 ply (roll 500 sq. ft.), 10¢.....\$2.50 @ 3.00
2 ply, roll 108 sq. ft.....60 @ 65 c
3 ply, roll 108 sq. ft.....80 @ 87 c
Slater's Felt (roll 500 sq. ft.).....75 c
NOTE—Above prices often include de-
livery.
R. M. Stone Surfaced Roofing (roll
110 sq. ft.).....\$2.75
Sand and Emery—
Flint.....60 @ 60 @ 10 c
Garnet.....25 @ 20 @ 15 c

Parers— Apple—
Advance.....per doz. \$4.50
Baldwin.....per doz. \$4.50
Bonanza Improved.....each \$7.50
Dandy.....each \$7.50
Eureka Improved.....each \$20.00
Family Bay State.....per doz. \$15.00
Improved Bay State.....per doz. \$36.00
New Lightning.....per doz. \$7.50
Reading 72.....per doz. \$4.00
Reading 78.....per doz. \$7.00
Turn Table '98.....per doz. \$6.75
White Mountain.....per doz. \$6.00
Potato—
Saratoga.....per doz. \$7.00
White Mountain.....per doz. \$6.00
Paris Green—
Less than 1 ton, per lb.
Arsenic kegs or casks.....12 c
Kegs, 100 to 175 lbs.....13 c
Kits, 14, 28, 56 lbs.....14 c
Paper boxes, 2 to 5 lbs.....14 c
Paper boxes, 1 lb.....15 c
Paper boxes, 1/2 lb.....15 c
Paper boxes, 1/4 lb.....15 c
1 to 5 tons, 1 cent per lb. less; 5 tons
and over, 1 1/2 cents per lb. less.
Picks and Mattocks—
List Feb. 23, 1899.....65 @ 10 @ 70 c
Pinking Irons—
See Irons, Pinking.
Pins— Escutcheon—
Brass.....60 @ 60 @ 10 c
Iron, list Nov. 11, '85.....50 @ 60 @ 10 c
Pipe, Cast Iron Soil—
Standard, 2-6 in.....60 @ 10 c
Extra Heavy, 2-6 in.....65 c
Fittings.....70 c
Pipe, Merchant,
Steel or Iron, Carload Lots,
J. O. B. Pittsburgh. Galva-
Merchant Pipe. Black, nized.
1/4, 3/4, 1 inch.....68 c
1 1/4 inch.....70 c
2 to 6 inch.....75 c
7 to 12 inch.....75 c
Less than carloads, 12 1/2 c advance.
Pipe Sewer—
Jobbers' Prices—
Standard Pipe and Fittings, 2 to 2 1/2 in.,
New England.....70 c
New York and New Jersey.....75 c
Maryland, Delaware, East Penn.....75 c
West Penn and West Va.....75 c
Virginia.....75 c
Ohio, Michigan and Ky.....75 c
Carload lots are generally delivered.
Pipe, Stove—
Edwards' Nested Stove Pipe:
C. L. L. C. L.
5 in., per 100 joints.....\$7.50 \$8.50
6 in., per 100 joints.....8.00 9.00
7 in., per 100 joints.....9.00 10.00
Planes and Plane Irons—
Wood Planes—
Bench, First quality.....40 @ 5 @ 40 @ 10 c
Bench, Second qual.....50 @ 5 @ 50 @ 10 c
Molding.....35 @ 5 @ 35 @ 10 c
Bailey's (Stanley R. & L. Co.)
5 @ 10 @ 25 @ 10 @ 10 c
Chapin-Stephens Co.:
Bench, First Quality.....40 @ 40 @ 10 c
Bench, Second Quality.....50 @ 50 @ 10 c
Molding.....35 @ 35 @ 10 c
Toy and German.....40 @ 40 @ 10 c
Gage Self Setting.....35 c
Union.....60 c
Iron Planes—
Bailey's (Stanley R. & L. Co.)
25 @ 10 @ 25 @ 10 @ 10 c
Chapin's Iron Planes.....50 @ 10 c
Miscellaneous Planes (Stanley R. & L.
Co.).....20 @ 10 @ 20 @ 10 @ 10 c
Sargent's.....60 c
Union.....60 c
Plane Irons—
Wood Bench Plane Irons.....
30 @ 5 @ 30 @ 10 c
Buck Bros.....30 c
Chapin-Stephens Co.....30 @ 30 @ 10 c
Stanley R. & L. Co.....30 @ 10 @ 30 @ 10 @ 10 c
L. & J. White.....20 @ 5 @ 20 @ 5 c
Planters, Corn, Hand.
Kohler's Eclipse.....per doz. \$8.50
Plates—
Felloe.....lb. 3 1/4 @ 4 c
Self-Sealing Pio Plates (S. S. & Co.),
per doz. \$2.00
Pliers and Nippers—
Button Pliers.....75 @ 75 @ 10 c
Gas Burner, per doz., 5 in., \$1.15 @
\$1.20; 6 in., \$1.35 @ 1.45
Gas Pipe, 7 8 10 12-in.
\$1.75 \$2.00 \$2.75 \$3.75
Acme Nippers.....50 @ 50 @ 5 c
Bernard's:
Parallel Pliers.....95 c
Paragon Pliers.....50 @ 5 c
Elm City Fence Pliers.....35 c
Cronk & Carrer Mfg. Co.:
American Butto.....75 @ 10 c
Cronk's.....60 c
Improved Button.....70 @ 10 c
Stub's Pliers.....33 @ 3 c
Beller's Farriers' Nippers, Pincers,
and Tools 40 @ 10 @ 40 @ 10 c
P. S. & W. Tinner's Cutting Nippers,
30 @ 30 @ 10 c
Swedish Side, End and Diagonal Cut-
ting Pliers.....50 c
Utica Drop Forge & Tool Co.
Pliers and Nippers, all kinds.....40 c
Plumbs and Levels—
Chapin Stephens Co.:
Plumbs and Levels.....30 @ 30 @ 10 @ 10 c
Chapin's Imp. Brass Cor.....40 @ 40 @ 10 @ 10 c
Pocket Levels.....50 @ 50 @ 10 @ 10 c
Level Glasses.....60 @ 60 @ 10 @ 10 c
Dianon's Plumbs and Levels.....70 c
C. E. Jennings & Co.'s Iron.....25 @ 10 c
C. E. Jennings & Co.'s Iron, Adjustable.....35 @ 10 c
Stanley R. & L. Co.....30 @ 10 @ 30 @ 10 @ 10 c

Butcher, Kitchen, &c.—
Foster Bros. Butcher, &c.....30 c
Hartzell Cutlery Co.....50 c
Smith & Hemenway.....40 @ 10 c
Hay and Straw—See Hay Knives.
Corn—
Withington Acme, per doz., \$2.65; Dent,
\$2.75; Adj. Serrated, \$2.20; Serrated,
\$2.10; Yankee No. 1, \$1.50;
Yankee No. 2, \$1.15.
Drawing—
Standard List.....70 @ 5 @ 70 @ 10 c
Bradley's.....70 @ 5 @ 70 @ 10 c
C. E. Jennings & Co. Nos. 45, 46, 60 @ 10 c
Jennings & Griffin, Nos. 51, 52, 60 @ 10 c
Swan's.....70 @ 10 @ 70 @ 10 c
Watrous.....10 @ 10 @ 10 c
L. & J. White.....20 @ 5 @ 20 @ 5 c
Hay and Straw—
Lightning.....per doz. \$6.50 @ 7.00
Iwan's Sickle Edge.....per doz. \$10.00
Iwan's Serrated.....per doz. \$10.00
Maine.....per doz. \$8.50
Mincing—
Buffalo.....per gro. \$13.00
Miscellaneous—
Farriers.....per doz. \$3.00 @ 5.00
Wostenholm's.....per doz. \$3.00 @ 3.25
Knobs—
Base, 3/4-inch, Birch, or Maple,
Rubber tip, gro.....\$1.10 @ 1.20
Carriage, Jap. all sizes, gro. 25 @ 30 c
Door, Mineral.....doz. 65 @ 70 c
Door, Por. Jap'd.....doz. 70 @ 75 c
Door, Por. Nickel.....doz. \$2.05 @ 2.15
Bardley's Wood Door, Shutter, &c., 1 1/2
Picture, Sargent's.....60 @ 10 c
Lacing Leather—
See Belting Leather.
Ladders Step Etc.—
Lane's Store.....25 c
Myers Noiseless Store Ladders.....50 c
Ladles— Melting—
L. & U. Mfg. Co.....25 c
P. S. & W.....50 c
Reading.....60 c
Sargent's.....45 @ 10 c
Lanterns— Tubular—
Regular Tubular No. 9, doz. \$1.25 @ 1.75
Lift Tubular, No. 0, doz. \$1.75 @ 2.25
Hinge Tubular, No. 0, doz. \$1.75 @ 2.25
Other Styles.....lb. 10 @ 10 c @ 10 c
Bull's Eye Police—
No. 1, 3 1/4 inch.....\$2.50 @ 2.75
No. 2, 3 inch.....\$2.75 @ 3.00

Machine— Boring—
Com., Upright, Without Augers.....\$2.00
Com., Angular, Without Augers.....\$2.25
Without Augers.
R. & E. Mfg. Co., Upright, Angular.
Improved No. 3, \$4.25 No. 1, \$5.00
Improved No. 4, \$4.75 No. 2, \$5.38
Improved No. 5, 2.75 No. 3, 3.38
Jennings', No. 4, 3.75 No. 1, 6.50
Miller's Falls.....5.75
Snell's, Rice's Pat. 2.50 2.75
Holisting—
Moore's Anti-Friction Differential Pul-
ley Block.....30 c
Moore's Hand Holist, with Lock Brake.....30 c
Moore's Portable Pneumatic Holist.....25 c
Ice Cutting—
Chandler's.....15 @ 10 c
Washing—
Boss Washing Machine Co.: Per doz.
Boss No. 1; Boss Rotary.....\$57.00
Boss No. 7; Dietz Rotary.....\$60.00
Champion Rotary, Banner No. 1.....\$54.00
Standard Champion No. 1.....\$54.00
Standard Perfection.....\$26.00
Cinti Square Western.....\$30.00
Unedda American, Rotind.....\$29.00
Mallets—
Hickory.....45 @ 5 @ 50 c
Lignumvite.....50 @ 5 @ 50 c
Tanner's, Hickory and Applewood,
doz.....50 @ 50 c
Mat— Door—
Elastic Steel (W. G. Co.).....10 c
Mattocks—
See Picks and Mattocks.
Menders— Hose
Robinson's Hose Menders.....per gro. \$2.00
Milk Cans— See Cans, Milk
Mills— Coffee, etc.—
Enterprise Mfg. Co.....25 @ 30 c
Hoffman's Sift, Coffee and Spice.....
doz.....50 @ 50 c
National, list Jan. 1, '04.....30 c
Parker's Columbia & Victoria, 50 @ 10 @ 60 c
Parker's Box and Side.....50 @ 10 @ 60 c
Swift, Lane Bros Co.....30 c
Mowers, Lawn—
Net prices are generally quoted.
Cheap.....all sizes. \$1.50 @ 1.95
Good.....all sizes. \$2.25 @ 2.50
10 12 14 16-inch
High Grade 4.25 4.50 4.75 5.00
Continental.....60 @ 10 c
Great American.....7 c
Quaker City.....60 @ 10 c
Pennsylvania.....70 c
Penn. Ivania Ball Bearing.....60 @ 5 c
Pennsylvania Golf.....50 c
Pennsylvania Horse.....40 c
Philadelphia.....45 c
Sty. M. S. C. K. T.....70 @ 10 c
Style A, all Steel.....60 @ 10 c
Style E, High Wheel.....70 @ 10 c
Drexel and Gold Coin, low list.....50 @ 5 c
Nails—
Cut and Wire. See Trade Report.
Wire Nail and Brads, Papered.
List July 20, 1899.
85¢ 10¢ 10¢ 55¢ 10¢ 10¢ 10¢
Hungarian, Finishing, Upholster-
ers, &c. See Tacks.

Putnam
Cold Roll'd 10¢ 18¢ 17¢ 16¢10 @ 10 c
American, Nos. 5 to 10 per lb. 9 @ 10 c
Neponset.....Nov. 5 to 10¢ per lb. 12¢
Jobbers' special brands.....per lb. 8 @ 9 c
Picture
1 1/2 2 3 1/2 3 1/2 in.
Brass Head. 45 60 70 95 1.00 gro.
Por. Head.....1.10 1.10 1.10
Crown Picture Nails.....per gro. \$1.50
Nippers, See Pliers and Nippers.
Nuts—
Cold Punched: Off list.
Mfrs. or U. S. Standard.
Square, plain.....\$1.50
Hexagon, plain.....\$1.50
Square, C. T. & R.....\$1.70
Hexagon, C. T. & R.....\$1.70
Hot Pressed:
Mfrs. U. S. or Nar. Gauge Stand.
Square Blank.....\$4.50
Hexagon Blank.....\$5.00
Square Tapped.....\$4.60
Hexagon Tapped.....\$4.80
Oakum—
Best or Government.....lb. 6 1/4 c
Navy.....lb. 4 1/4 c
U. S. Navy.....lb. 5 1/4 c
Plumbers' Spun Oakum.....2 1/4 c
In carload lots 1/4 lb. off f.o.b. New
York.

Oil Tanks—See Tanks, Oil.
Oilers—
Brass and Copper.....65 @ 65 @ 10 c
Tin or Steel.....70 @ 10 @ 75 c
Zinc.....75 @ 75 @ 10 c
Chas. or Paragon:
Brass and Copper.....65 @ 65 @ 10 c
Tin or Steel.....75 @ 75 @ 10 c
Zinc.....75 @ 75 @ 10 c
Malleable, Hammers' Improved, No. 1,
\$3.60; No. 2, \$4.40; No. 3, \$4.40 per doz.
Malleable, Hammers' Old Pattern,
same list.....50 @ 10 c
Ame. I. n T. & Stamping Co.:
Spring Bottom Cans.....70 @ 70 @ 10 c
Railroad Oilers etc.....60 @ 60 @ 10 c
Openers— Can—
French.....doz. 35 c
Iron Handle.....doz. 25 @ 7 c
Sprague, Iron Hide.....per doz. 35 @ 40 c
Sardine Scissors.....doz. \$1.75 @ \$3.00
Marvel.....per doz. \$1.25
National.....50 c
Stowell's.....per doz. 35 @ 45 c
Tip Top.....per doz. 30 @ 75 c
Egg—
Nickel Plate.....per doz. \$2.25
Silver Plate.....per doz. \$3.50
Packing—
Asbestos Packing, Wick and Rope,
L @ 15¢ lb.
Rubber—
Sheet, C. I.....8 @ 12 c
Sheet, C. I.....9 @ 13 c
Sheet, C. B. S.....10 @ 14 c
Sheet, Pure Gum.....50 @ 70 c
Sheet, Red.....55 @ 40 c
Jenkins' Standard, 1/2 @ 80¢.....25 @ 25 @ 5 c
Miscellaneous—
American Packing.....7 @ 10 c lb.
Cotton Packing.....15 @ 15 c lb.
Italian Packing.....9 @ 15 c lb.
Jute.....3 1/4 @ 5 c lb.
Russia Packing.....7 @ 11 c lb.
Pails— Creamery
S. S. & Co., with gauges.. No 1 \$6.25;
No. 2, \$4.50 per doz.
Galvanized—
Price per doz.
Quart.....10 12 14
Water, Regular.....1.75 2.00 2.25
Water, Heavy.....2.75 3.00 3.25
Fire, Rd. Bottom. 2.30 2.60 2.90
Well.....2.25 2.50 2.75
Pans— Dripping—
Standard List.....60 @ 5 @ 60 @ 10 c
Fry—
Common Lipped:
No. 1 2 3 4 5
Per doz. \$0.95 1.05 1.15 1.30 1.65
Roasting and Baking—
Regal, S. S. & Co., per doz. Nos. 5, \$4.50;
10 \$5.25; 20 \$5.75; 30 \$6.25.
Simplex, per doz.:
No. 40 50 60 140 150 160
\$2.75 3.25 3.75 3.00 3.25 4.00
Paper—Building Paper—
Asbestos: lb.
Building Felt.....23 c
Mill Board, sheet, 40 x 40 inches 34 c
Mill Board, roll, thicker than 1-16
inch.....34 c
Mill Board, roll, 1-16 in. thick and
less.....24 c
Per roll
Rosa Sized Sheathing: 500 sq. ft.
Light wt., 25 lbs. to roll, \$0.45 @ 0.50
Medium wt., 35 lbs. to roll, \$0.55 @ 0.65
Heavy wt., 40 lbs. to roll, \$0.65 @ 0.75
Black Water Proof Sheathing, 500
sq. ft., 1 ply, 6c; 2 ply, 8c; 3
ply, \$1.10; 4 ply, \$1.25.
Deafening Felt, 9, 6 and 4 1/2 sq. ft.
to lb., to roll.....\$4.00
Red Rope Roofing, 250 sq. feet per
roll.....\$1.65
NOTE—These goods are often sold at
delivered prices.
Tarred Paper.
1 ply (roll 500 sq. ft.), 10¢.....\$2.50 @ 3.00
2 ply, roll 108 sq. ft.....60 @ 65 c
3 ply, roll 108 sq. ft.....80 @ 87 c
Slater's Felt (roll 500 sq. ft.).....75 c
NOTE—Above prices often include de-
livery.
R. M. Stone Surfaced Roofing (roll
110 sq. ft.).....\$2.75
Sand and Emery—
Flint.....60 @ 60 @ 10 c
Garnet.....25 @ 20 @ 15 c

Stanley's Duplex.....20@20&10&10¢
Woods' Extension.....39¢
Poachers, Egg—
Buffalo Steam Egg Poachers, per doz.
No. 1, \$4.00; No. 2, \$3.00; No. 3,
\$2.00; No. 4, \$1.20.....50¢
Points, Glaziers'—
Bulk and 1 lb. papers.....lb. 8½¢
lb. papers.....lb. 9¢
lb. papers.....lb. 9½¢

Pokes, Animal—
Madison Hawkeye.....per doz. \$3.25
Madison Western.....per doz. \$4.10
Police Goods—
Manufacturers' Lists.....25@25&25¢
Tower's.....25¢

Polish—Metal—
Prestoline Liquid, No. 1 (½ pt.), per doz.
\$4.00; No. 2 (1 qt.), \$3.75.....40¢
Promoline Paste.....40¢
George W. Hoffman:
1. S. Metal Polish Paste, 3 oz. boxes, per
doz. 50¢; gr. \$4.50; ½ lb. boxes, per
doz. \$1.25; 1 lb. boxes, per doz. \$2.25.
2. S. Liquid, 8 oz. cans, per doz. \$1.25;
½ gr. \$1.00.
Barkeepers' Friend Metal Polish, per doz.
\$1.75; per gr. \$18.00.
Wynn's White Silk, ½ pt. cans, per
doz.....\$2.00

Stove—
Black Eagle Benzine Paste, 5 lb. cans.....
Black Eagle, Liquid, ½ pt. cans, per doz. 75¢
Black Jack Paste, ½ lb. cans, per gr. \$9.00
Lud's Black Beauty, gr. \$10.00.....50¢
Joseph Dixon's, gr. \$5.75.....10¢
Dixon's Plumbago.....10¢
Fireclad.....per gr. \$2.50
Grip, gr. \$4.50.....per gr. \$3.50
Japanese.....per gr. \$3.50
Jet Black.....per gr. \$3.50
Peelless Iron Enamel, ½ pt. cans.....
per doz. \$1.50

Wynn's:
Black Silk, 5 lb. pail.....each 70¢
Black Silk, ½ lb. box.....per doz. \$1.00
Black Silk, 5 oz. box.....per doz. \$0.75
Black Silk, ½ pt. liq.....per doz. \$1.00

Poppers, Corn—
1 qt., Square.....gro. \$9.00
1 qt., Round.....gro. \$10.00
1 ½ qt., Square.....gro. \$11.00
2 qt., Square.....gro. \$15.00

Post Hole and Tree Augers and Diggers—
See also Diggers, Post Hole, &c.

Posts, Steel—
Steel Fence Posts, each, 5 ft., 42¢; 6
ft., 46¢; 8 ft., 52¢.
Steel Hitching Posts, each.....\$1.30

Potato Parers—
See Parers, Potato.

Pots—Glue—
Enameled.....10¢
Tinned.....55¢

Powder—
in Cansisters:
Duck, 1 lb. each.....45¢
Fine Sporting, 1 lb. each.....75¢
Rifle, ½ lb. each.....15¢
Rifle, 1 lb. each.....25¢
King's Semi-Smokeless:
Keg (25 lb. bulk).....\$8.50
Half Keg (12½ lb. bulk).....\$3.50
Quarter Keg (6¼ lb. bulk).....\$1.90
Case 24 (1 lb. cans bulk).....\$8.50
Half case (1 lb. cans bulk).....\$4.50
King's Smokeless: Shot Gun Rifle
Keg (25 lb. bulk).....\$12.00
Half Keg (12½ lb. bulk).....\$6.25
Quarter Keg (6¼ lb. bulk).....\$3.25
Case 24 (1 lb. cans bulk).....\$4.00
Half case 12 (1 lb. cans bulk).....\$2.25
Robin Hood Shot Gun.....50¢
20¢

Presses—
Fruit and Jelly—
Enterprise Mfg. Co.....20@25¢
Sensible.....35¢
2 qt., \$2.00; 4 qt., \$4.00; 10 qt., \$6.00 each.
Sea Presses—
Morrill's No. 1, per doz. \$20.00.....50¢
Morrill's No. 2, per doz. \$22.50.....50¢

Pruning Hooks and Shears—See Shears.
Pullers Nail—
Cyclops.....50¢
Miller's Falls, No. 3, per doz. \$12.00.....35¢
Pearson's No. 1, Cyclone Spike Puller,
each \$57.50.....50¢
Poucan, per doz. \$9.00.....40¢
Scranton, Case Lots:
No. 1 (large), per doz. \$6.50; No. 2 (large),
\$5.75; No. 3 (small), \$5.00; No. 3-B (large),
\$5.50; No. 3-B (small), \$4.00; No. 2-D
(large), \$4.50; No. 3-D (small) \$4.00.
Smith & Hemenway Co.:
Ajax.....60¢
Diamond B. No. 2, case lots, per doz. \$6.00
Diamond B. No. 3, case lots, per doz. \$5.50
Eureka.....30¢
Giant, No. 1, per doz. \$15.00; No. 2, \$16.50;
No. 3, \$15.00.....40¢
Yankee.....60¢

Pulleys—Single Wheel—
Inch.....2 2½ 3
Avening, doz. \$9.50 75 1.00
Hay Fork, Steel or Solid Eye.....
doz., 4 in., \$9.95; 5 in., \$11.75
Inch.....2 2½ 3
Hot House, doz. \$9.60 80 1.10
Inch.....14 1½ 1¾
Screw, doz. \$9.14 17 20
Inch.....14 1½ 1¾
Side, doz. \$9.27 35 24
Inch.....14 1½ 1¾
Tackle, doz. \$9.27 37 50
Stowell's:
Ceiling or End, Anti-Friction.....60¢
Dumb Waiter, Anti-Friction.....60¢
Hay Fork, Anti-Friction, 5-in. Wheel,
per doz. \$12.00.....50¢
Electric Light.....60¢
Slide, Anti-Friction.....0-10¢

Sash Pulleys—
Common Frame: Square or Round
End, per doz., 14 in., 13¢; 2 in., 15¢
Auger Mortise, no Face Plate, per
doz. 14 in., 12¢; 2 in., 15¢
Auger Mortise, with Face Plate, per
doz., 14 in., 13¢; 2 in., 15¢
Acme.....14 in., 16¢; 2 in., 19¢
Common Sense, 14 in., per doz. 18¢;
2 in., 20¢
Fox-All-Steel, Nos. 3 and 7, 3 in., per doz. 35¢
No. 9, 14 in., per doz. 20¢
Extra for Plated Finish.....per doz. 20¢
Extra for Anti-Friction Bronze
Bushing.....per doz. 10¢
Grand Rapids All-Steel Noiseless.....40¢
Ideal No. 13.....14 in., per doz. 18¢
Niagara.....14 in., 16¢; 2 in., 19¢
No. 30, Troy.....14 in., 14¢; 2 in., 16¢
Star.....14 in., 16¢; 2 in., 19¢
Tackle Blocks—See Blocks.

Pumps—
Citern.....60@80¢
Pitcher Spout.....75¢
Wood.....50¢
Pump Leathers, Lower and Plunger
Values—Per gro.:
Inch.....2 2½ 2¾ 3
\$2.30 2.50 2.75 3.00
Inch.....3 3½ 3¾ 4
\$3.30 3.60 3.85 4.10 4.40
Barnes Dbl. Acting (low list).....50¢
Contractors' Rubber Diaphragm No. 2.....
R. & L. Black.....\$1.50
Flint & Walling's Fast Mail (low list).....55¢
Flint & Walling's Pitcher Spout.....75¢
Loud's Suction Pumps, U. A. Co.....20¢
Myer's Pumps, low list.....50¢
Hench Pump, each, \$10.00.....50¢
Myer's Power Pumps.....50¢
Daisy Spray Pump.....per doz. \$7.50
Myer's Spray Pumps.....50¢

Punches—
Saddlers' or Drive, good.....doz. 65¢
Spring, single tube, good quality.....
\$1.75@2.00
Revolving (tubes).....doz. \$3.75@4.00
Bemis & Call Co.'s Cast Steel Drive.....50¢
Bemis & Call Co.'s Check.....55¢
Bemis & Call Co.'s Spring.....50¢
Morrill's No. 1 (A. B. C.).....per doz. \$15.00
No. 2, per doz. \$22.50.....50¢
No. 2, Metal, per doz. \$45.00.....50¢
Hench Punch, each, \$10.00.....50¢
Niagara Hollow Punches.....40¢
Niagara Solid Punches.....55¢
Steel Screw, B. & K. Mfg. Co.....40¢
Tinner's Hollow, P. S. & W. Co. 35¢
Tinner's Solid, P. S. & W. Co., per doz. \$1.44.....60¢

Rail—Barn Door, &c.—
Cast Iron, Barn Door: Flange Screw
Holes for Rd. Groove Wheels:
½ ¾ 1 in.
\$1.70 \$2.10 \$3.00 100 feet.
Angular for Sq. Groove Wheels:
Small Med. Large.
\$1.00 1.95 2.70 100 feet.
Sliding Door, Brased Wrt Iron, ft. 8½¢
Sliding Door, Iron Painted.....2½¢
Sliding Door, Wrought Brass, 14
in.....lb. 30¢
Allith Mfg. Co. Reliable Hanger Track
per foot.....10¢
Cronk's Double Braced Steel Rail, per
foot.....34¢
Cronk's O. N. T. Rail.....34¢
Lanes' O. N. T., per 100 ft., 1 inch, \$3.10;
1½ inch, \$3.90; 1½ inch, \$4.85.
Lanes' Standard, per 100 ft.....2.75
Lawrence Bros.....per ft. 4½¢
Lawrence Bros. New York.....34¢
McKinney's Hinged Hanger Rail, per
foot, 1½ in.....50¢
McKinney's Nona Better.....per ft. 34¢
McKinney's Standard.....per ft. 4½¢
Myer's Stayon Track.....50¢
Smith's Wrought Bracket, Plain.....34¢
Smith's Special.....44¢
Smith's Never Jump, per ft. 11¢
Smith's Plain Steel.....30¢
Smith's Milled Steel.....44¢
Stowell's Cast Rail.....14¢
Stowell's Steel Rail, Plain.....25¢
Stowell's Wrought Bracket, Plain.....34¢
Swett's Hinge, per ft. 11¢
Swett's P. L. B. Steel Rail, per 100 ft. \$3.50

Rakes—
Net Prices, Malleable Rakes:
10 12 14 16-tooth
Shank.....\$1.50 1.60 1.75 1.85
Socket.....\$1.65 1.80 1.95 2.10
Steel, August 1, 1899, List.....0.65¢
Malleable.....70¢
Lawn Rake, Metal Head, per doz.
20 teeth.....\$1.25@1.50
24 teeth.....\$1.60@1.75
Fort Madison Red Head Lawn.....\$1.25
Fort Madison Blue Head Lawn.....\$1.00
Jackson Lawn, 20 and 30 teeth, per doz. \$4.00
Kohler's:
Lawn Queen, 20-tooth, per doz.....\$3.45
Lawn Queen, 24-tooth, per doz.....\$3.60
Paragon, 21-tooth, per doz.....\$2.75
Paragon, 24-tooth, per doz.....\$3.00
Steel Garden, 14-tooth, per doz.....\$2.98
Malleable Garden, 14-tooth, per doz. \$2.00

Rasps, Horse—
Diston's.....75¢
Hill or Bros.....70¢
McCahey's American Standard.....60¢

New Nicholson.....70¢
See also Files.

Razors—
Boracic.....60¢
Fox Razors, No. 42.....per doz. \$20.00
Fox Razors, No. 44.....per doz. \$20.00
Fox Razors, No. 82, Platina, per doz. \$25.00
Red Devil.....60¢
Billestein.....\$18.00
Griffin, No. 65.....\$15.00
Griffin, No. 60.....\$12.00
All other Razors.....40¢
Safety Razors.....60¢

Safety Razors—
New Gem, in Tin Boxes.....per doz. \$12.00
New Gem, Extra Blades.....per doz. \$8.35
Gem Outlets (Razor, Strop, etc.).....per doz. \$5.60
Complete Razor, extra Blade in Leather
Case.....per doz. \$27.00

Reels—Fishing—
Bishop's Independent Fish Reel Spooler,
per doz.....\$30.00
Hendryx:
M. G. 6, A. B. 6, M. G. 4008, Silver
Rubber Populo, Nickel Populo,
Aluminum, German Silver, Bronze,
3 01 N. (6 N. 4 N to 8 P.N.).....39¢
6 RW, 102 P and RN, 203 P and P.N. 40¢
G. 9.....30¢
24 N to 25 P.N.....35¢
124 N, 974 P.N. 002004 P.N. 1020 R
and PRN, 203 PR and PRN.....50¢
2004 N.....50¢
2004 P.....50¢
2004 P.N.....50¢
0924 N.....40¢
0204 N.....45¢
Single Action Trout.....40¢
986 P 802 and 802 N.....04¢
Competitor, 304 and 304 P.N.....35¢
0304 P and P.N.....40¢
Safety and Salmon.....30¢

Registers—List Sept. 2, 1901.

Black Jap.....
White Jap.....
Bronzed.....
Nickel Plated.....
Electro Plated.....
There is a good deal of irregularity in
prices of Registers.

Revolvers—
Single Action.....85¢
Double Action, except 44 cal. \$1.50@1.65
Double Action, 44 caliber. \$1.00@1.65
Automatic.....\$2.75@3.00
Hammerless.....\$3.25@3.60

Riddles, Grain or Sand—
16 in., per doz.....\$2.75@3.00
17 in., per doz.....\$3.00@3.25
18 in., per doz.....\$3.25@3.50

Rings and Ringers—
Bull Rings—
Steel.....\$0.70 2 2½ 3 Inch
Copper.....1.00 1.10 1.35 doz.

Hog Rings and Ringers—
Hill's Rings.....gro. boxes, \$4.50@4.50
Hill's Ringers, Gray Iron, doz. 55¢
Hill's Ringers, Mal. Iron, doz. 75¢
Blair's Rings.....per gro. \$5.00@5.25
Blair's Ringers.....per doz. \$0.60@.65
Brown's Rings.....per gro. \$5.50@5.75
Brown's Ringers.....per doz. \$0.75@1.00

Rivets and Burrs—
Copper.....50¢
Iron or Steel.....75¢
Miscellaneous.....75¢

Rollers—
Acme, Stowell's Anti-Friction.....50¢
Barn Door, Sargent's list.....60¢
Cronk's Stay.....60¢
Cronk's Brinkerhoff.....60¢
Lane's Stay.....35¢
Stowell's Barn Door Stay.....per doz. \$1.25

Rope—
Manila, 7-16 in. and larger,
tarred or untarred.....lb. 11¢
Manila, ¾-inch.....lb. 11½¢
Manila, ½ and 5-16 in.....lb. 12¢
Manila, Hay, Hide and
Bale Ropes, Medium and
Coarse.....lb. 12¢
Sisal, 7-16 in. and larger lb. 8¢
Sisal, ¾-inch.....lb. 8½¢
Sisal, ½ and 5-16 Inch.....lb. 9¢
Sisal, Hay, Hide and
Bale Ropes, Medium
and Coarse.....lb. 8¢
Sisal, Tarred, Medium
Lath Yarn.....lb. 7½¢
Cotton Rope:
Best.....¼-in. and larger, lb. 13½¢
Medium.....¼-in. and larger, lb. 11¢
Com.....¼-in. and larger, lb. 9¢
Jute Rope:
Thread No. 1, ¼-in. and up, lb. 6½¢
Thread No. 2, ¼-in. and up, lb. 6¢
Yarn, ¼-in. and up.....lb. 5¢
Old Colony Manila Transmission Rope,
per lb. 17½¢

Wire Rope—
Galvanized.....40¢
Plain.....45¢

Ropes, Hammocks—
Covert Mfg. Co.:
Jute.....40¢
Covert Saddle Works.....60¢

Rules—
Boxwood.....60¢
Chapin-Stephens Co.:
Boxwood.....60¢
Ivory.....35¢
Miscellaneous.....35¢
Combination.....55¢
Stationers.....10¢
Larkin's Steel.....50¢
Larkin's Lumber.....50¢
Stanley R. & L. Co.:
Boxwood.....60¢
Ivory.....35¢
Upon Nut Co.:
Boxwood.....60¢
Ivory.....35¢

Sash Locks—See Locks, Sash.
Sash Weights—
See Weights, Sash.

Sausage Stuffers or Fillers
—See Stuffers or Fillers, Sausage.

Saw Frames—See Frames, Saw.
Saw Sets—See Sets, Saw.

Saw Tools—See Tools, Saw.

Saws—
Atkin's:
Circular.....50¢
Band.....50¢
Cross Cuts.....35¢
Mulay, Mill and Drag.....50¢
One-Man Saw.....40¢
Wood Saws.....25¢
Hand, compass, &c.....40¢
Chapin-Stephens Co.:
Turning Saws and Frames.....30¢
Diamond Saw & Stamping Works:
Sterling Kitchen Saws.....25¢

Diston's:
Circular, Solid and Inserted Tooth.....50¢
Band, 3 to 14 in. wide.....65¢
Band, ¼ to 2¼.....70¢
Crosscuts.....45¢
Narrow Crosscuts.....50¢
Mulay, Mill and Drag.....50¢
Framed Wood Saws.....35¢
Wood Saw Blades.....35¢
Wood Saw Rods.....25¢
Hand Saws, Nos. 12, 99, 9, 16, 4100,
Ds. 120, 70, 72, 8.....25¢
Hand Saws, Nos. 107, 107½, 3, 1,
0, 60, Combination.....30¢
Compass, Keyhole, &c.....25¢
Butcher Saws and Blades.....35¢
C. E. Jennings & Co.'s:
Back Saws.....25¢
Butcher Saws.....30¢
Compass and Keyhole Saws.....35¢
Framed Wood Saws.....30¢
Hand Saws.....30¢
Wood Saw Blades.....30¢
Mills Falls:
Butcher Saws.....15¢
Star Saw Blades.....15¢

Pease:
Circular and Mill.....50¢
Cross Cuts, list Jan. 1, '99.....50¢
Hand, Panel and Rip.....30¢
Richardson:
Circular and Mill.....50¢
Hand, &c.....30¢
X Cuts, list Jan. 1, '99.....50¢
Simonds:
Circular Saws.....50¢
Crescent Ground Cross Cut Saws.....35¢
One-Man Cross Cuts.....40¢
Grain Mill, Mulay and Drag Saws.....30¢
Band Saws.....25¢
Back Saws.....25¢
Butcher Saws.....25¢
Hand Saws.....25¢
Han I Saws, Bay State Brand.....25¢
Compass, Keyhole, &c.....25¢
Wood Saws.....25¢

Hack Saws—
Atkins' Hack Saw Blades A A A.....30¢
Diston:
Concave Blades.....25¢
Keystone.....40¢
Hack Saw Frames.....30¢
Pittsburg File Works, The Best.....25¢
C. E. Jennings & Co.'s:
Hack Saw Frames, Nos. 175, 180.....35¢
Hack Saws, Nos. 175, 180, complete.....35¢
Griffin's Hack Saw Frames.....35¢
Griffin's Hack Saw Blades.....35¢
Star Hack Saws and Blades.....15¢
Sterling Hack Saw Blades.....35¢
Sterling Hack Saw Frames.....35¢

Scroll—
Barnes' No. 7, \$15.....25¢
Barnes' Scroll Saw Blades.....40¢
Barnes' Velpolped Power Scroll Saw,
without boring attachment, \$18.....20¢
Lester, complete, \$10.00.....15¢
Rogers, complete, \$4.00.....15¢

Scalers, Fish—
Bishop's Lightning.....per doz. \$3.10
Covert's Saddle Works.....60¢

Scales—
Family, Turnbull's.....30¢
Counter:
Hatch, Platform, ½ doz to 10 lbs. doz. \$5.70
Two Platforms, ½ doz to 8 lbs. doz. \$11
Union Platform, Plain.....\$1.70@1.90
Union Platform, Striped \$1.85@2.15
Chaffillon's:
Eureka.....25¢
Favorite.....40¢
Grocers' Trip Scales.....30¢
Pelouse Scales—Household, Counter,
Candy, Ice, Postal, Computing.....50¢
"The Standard" Portables.....45¢
"The Standard" R. R. and Wagon.....50¢

Scrapers—
Box, 1 Handle.....doz. \$2.25@2.50
Box, 2 Handle.....doz. \$3.00@3.50
Ship Light, \$2.50; Heavy, \$4.00
Adjustable Box Scraper (S. R. & L. Co.)
\$6.00.....30¢
Chapin-Stephens Co., Box.....30¢

Screens, Window, and Frames—
Flyer Pattern Window Screen.....60¢
Maine Window Screen Frames.....60¢
Perfection Window Screens.....60¢
Phillips' Window Screen Frames.....60¢
Porter's:
Fairview Window Screens.....60¢
Hummer Window Screens.....60¢
Klondike Window Screens.....60¢

See also Doors.

Screws—Bench and Hand—

Bench, Iron, doz. 1 in., \$2.75 @ 3.00 ;
1 1/4, \$3.25 @ 3.50 ; 1 1/2, \$3.50 @ 4.25
Bench, Wood, Beech, doz. \$3.00 @ 3.50
Hand, Wood, 70¢ @ 1.50 @ 5¢
Hand, R. Bliss Mfg. Co., Hand, 30¢
Chapin-Stephens Co., Hand, 30¢ @ 10¢
Coach, Lag and Hand Rail,
Lag, Common Point, list Oct. 1,
99, 70¢ @ 1.50 @ 5¢
Coach and Lag, Gimlet Point, list
Oct. 1, '99, 70¢ @ 1.50 @ 5¢
Hand Rail, list Jan. 1, '81, 60¢ @ 1.00 @ 5¢

Jack Screws—

Standard List, 75¢ @ 1.00 @ 80¢ @ 5¢
Millers Falls, 50¢ @ 1.00 @ 10¢
Millers Falls, Roller, 50¢ @ 10¢
P. S. & W., 50¢ @ 50¢ @ 10¢
Sargent, 70¢ @ 10¢

Machine—

List Jan. 1, '98,
Flat or Round Head, Iron, 50¢ @ 50¢ @ 10¢
Flat or Round Head, Brass, 50¢ @ 50¢ @ 10¢

Set and Cap—

Set (Iron or Steel) 70¢
Sq. Hd. Cap, 65¢
Hex. Hd. Cap, 65¢
Rd. or Filler Hd. Cap, 60¢

Wood—

List Jan. 1, 1900,
Manufacturers' printed discounts :
Flat Head, Iron, 87¢ @ 1.00 @ 5¢
Round Head, Iron, 85¢ @ 1.00 @ 5¢
Flat Head, Brass, 85¢ @ 1.00 @ 5¢
Round Head, Brass, 80¢ @ 1.00 @ 5¢
Flat Head, Bronze, 77¢ @ 1.00 @ 5¢
Round Head, Bronze, 75¢ @ 1.00 @ 5¢
Drive Screws, 87¢ @ 1.00 @ 5¢

Scroll Saws—See Saws, Scroll,

Scythes— Per doz.
Clipper Pattern, Grass, \$1.50 @ \$5.00
Full Polished Clipper, \$5.00 @ \$5.50
Grain, \$7.00 @ \$7.50
Clipper, Grain, \$7.50 @ \$8.25
Wood and Bush, \$4.75 @ \$5.00

Seeders—Raisin—

Enterprise, 25¢ @ 30¢
Sets—Axl and Tool—
Broad Axl and Tool Set,
Wood 11 lb., 10 Axl, doz. \$2.00 @ 2.25
Wood 14 lb., 14 Axl, 6 Tools,
doz. \$2.50 @ 2.60

Aiken's Sets, Axl and Tools
No. 20, 7 doz. \$10.00, 50¢ @ 1.00 @ 10¢
Fray's Axl, Tool H'ds., Nos. 1, 1 1/2, 2,
3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 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1186, 1187, 1188, 1189, 1190, 1191, 1192, 1193, 1194, 1195, 1196, 1197, 1198, 1199, 1200, 1201, 1202, 1203, 1204, 1205, 1206, 1207, 1208, 1209, 1210, 1211, 1212, 1213, 1214, 1215, 1216, 1217, 1218, 1219, 1220, 1221, 1222, 1223, 1224, 1225, 1226, 1227, 1228, 1229, 1230, 1231, 1232, 1233, 1234, 1235, 1236, 1237, 1238, 1239, 1240, 1241, 1242, 1243, 1244, 1245, 1246, 1247, 1248, 1249, 1250, 1251, 1252, 1253, 1254, 1255, 1256, 1257, 1258, 1259, 1260, 1261, 1262, 1263, 1264, 1265, 1266, 1267, 1268, 1269, 1270, 1271, 1272, 1273, 1274, 1275, 1276, 1277, 1278, 1279, 1280, 1281, 1282, 1283, 1284, 1285, 1286, 1287, 1288, 1289, 1290, 1291, 1292, 1293, 1294, 1295, 1296, 1297, 1298, 1299, 1300, 1301, 1302, 1303, 1304, 1305, 1306, 1307, 1308, 1309, 1310, 1311, 1312, 1313, 1314, 1315, 1316, 1317, 1318, 1319, 1320, 1321, 1322, 1323, 1324, 1325, 1326, 1327, 1328, 1329, 1330, 1331, 1332, 1333, 1334, 1335, 1336, 1337, 1338, 1339, 1340, 1341, 1342, 1343, 1344, 1345, 1346, 1347, 1348, 1349, 1350, 1351, 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CURRENT METAL PRICES.

MAY 6, 1903.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market reports.

IRON AND STEEL—
Bar Iron from Store—

Refined Iron:	
1 to 1 1/4 in. round and square.....	@ 2.20¢
1 1/4 to 4 in. x 3/4 to 1 in.	@ 2.10¢
1 1/4 to 4 in. x 1/2 to 5/8 in.	@ 2.40¢
Rods—3/4 and 1-1/2 round and square.....	@ 2.40¢
Angles:	
3 in. x 1/2 in. and larger.....	2.35¢
3 in. x 3/4 in. and 1/2 in.	2.60¢
1 1/4 to 2 1/2 in. x 1/2 in.	2.40¢
1 1/4 to 2 1/2 in. x 3/4 in. and thicker.....	2.35¢
1 to 1 1/4 in. x 3/4 in.	2.40¢
1 to 1 1/4 in. x 1/2 in.	2.45¢
3/4 x 1 1/4 in.	2.60¢
3/4 x 1 1/2 in.	2.70¢
3/4 x 1 3/4 in.	2.80¢
3/4 x 2 in.	2.90¢
3/4 x 2 1/2 in.	3.00¢
3/4 x 3 in.	3.10¢
3/4 x 3 1/2 in.	3.20¢
3/4 x 4 in.	3.30¢
3/4 x 4 1/2 in.	3.40¢
3/4 x 5 in.	3.50¢
3/4 x 5 1/2 in.	3.60¢
3/4 x 6 in.	3.70¢
3/4 x 6 1/2 in.	3.80¢
3/4 x 7 in.	3.90¢
3/4 x 7 1/2 in.	4.00¢
3/4 x 8 in.	4.10¢
3/4 x 8 1/2 in.	4.20¢
3/4 x 9 in.	4.30¢
3/4 x 9 1/2 in.	4.40¢
3/4 x 10 in.	4.50¢
3/4 x 10 1/2 in.	4.60¢
3/4 x 11 in.	4.70¢
3/4 x 11 1/2 in.	4.80¢
3/4 x 12 in.	4.90¢
3/4 x 12 1/2 in.	5.00¢
3/4 x 13 in.	5.10¢
3/4 x 13 1/2 in.	5.20¢
3/4 x 14 in.	5.30¢
3/4 x 14 1/2 in.	5.40¢
3/4 x 15 in.	5.50¢
3/4 x 15 1/2 in.	5.60¢
3/4 x 16 in.	5.70¢
3/4 x 16 1/2 in.	5.80¢
3/4 x 17 in.	5.90¢
3/4 x 17 1/2 in.	6.00¢
3/4 x 18 in.	6.10¢
3/4 x 18 1/2 in.	6.20¢
3/4 x 19 in.	6.30¢
3/4 x 19 1/2 in.	6.40¢
3/4 x 20 in.	6.50¢
3/4 x 20 1/2 in.	6.60¢
3/4 x 21 in.	6.70¢
3/4 x 21 1/2 in.	6.80¢
3/4 x 22 in.	6.90¢
3/4 x 22 1/2 in.	7.00¢
3/4 x 23 in.	7.10¢
3/4 x 23 1/2 in.	7.20¢
3/4 x 24 in.	7.30¢
3/4 x 24 1/2 in.	7.40¢
3/4 x 25 in.	7.50¢
3/4 x 25 1/2 in.	7.60¢
3/4 x 26 in.	7.70¢
3/4 x 26 1/2 in.	7.80¢
3/4 x 27 in.	7.90¢
3/4 x 27 1/2 in.	8.00¢
3/4 x 28 in.	8.10¢
3/4 x 28 1/2 in.	8.20¢
3/4 x 29 in.	8.30¢
3/4 x 29 1/2 in.	8.40¢
3/4 x 30 in.	8.50¢
3/4 x 30 1/2 in.	8.60¢
3/4 x 31 in.	8.70¢
3/4 x 31 1/2 in.	8.80¢
3/4 x 32 in.	8.90¢
3/4 x 32 1/2 in.	9.00¢
3/4 x 33 in.	9.10¢
3/4 x 33 1/2 in.	9.20¢
3/4 x 34 in.	9.30¢
3/4 x 34 1/2 in.	9.40¢
3/4 x 35 in.	9.50¢
3/4 x 35 1/2 in.	9.60¢
3/4 x 36 in.	9.70¢
3/4 x 36 1/2 in.	9.80¢
3/4 x 37 in.	9.90¢
3/4 x 37 1/2 in.	10.00¢
3/4 x 38 in.	10.10¢
3/4 x 38 1/2 in.	10.20¢
3/4 x 39 in.	10.30¢
3/4 x 39 1/2 in.	10.40¢
3/4 x 40 in.	10.50¢
3/4 x 40 1/2 in.	10.60¢
3/4 x 41 in.	10.70¢
3/4 x 41 1/2 in.	10.80¢
3/4 x 42 in.	10.90¢
3/4 x 42 1/2 in.	11.00¢
3/4 x 43 in.	11.10¢
3/4 x 43 1/2 in.	11.20¢
3/4 x 44 in.	11.30¢
3/4 x 44 1/2 in.	11.40¢
3/4 x 45 in.	11.50¢
3/4 x 45 1/2 in.	11.60¢
3/4 x 46 in.	11.70¢
3/4 x 46 1/2 in.	11.80¢
3/4 x 47 in.	11.90¢
3/4 x 47 1/2 in.	12.00¢
3/4 x 48 in.	12.10¢
3/4 x 48 1/2 in.	12.20¢
3/4 x 49 in.	12.30¢
3/4 x 49 1/2 in.	12.40¢
3/4 x 50 in.	12.50¢
3/4 x 50 1/2 in.	12.60¢
3/4 x 51 in.	12.70¢
3/4 x 51 1/2 in.	12.80¢
3/4 x 52 in.	12.90¢
3/4 x 52 1/2 in.	13.00¢
3/4 x 53 in.	13.10¢
3/4 x 53 1/2 in.	13.20¢
3/4 x 54 in.	13.30¢
3/4 x 54 1/2 in.	13.40¢
3/4 x 55 in.	13.50¢
3/4 x 55 1/2 in.	13.60¢
3/4 x 56 in.	13.70¢
3/4 x 56 1/2 in.	13.80¢
3/4 x 57 in.	13.90¢
3/4 x 57 1/2 in.	14.00¢
3/4 x 58 in.	14.10¢
3/4 x 58 1/2 in.	14.20¢
3/4 x 59 in.	14.30¢
3/4 x 59 1/2 in.	14.40¢
3/4 x 60 in.	14.50¢
3/4 x 60 1/2 in.	14.60¢
3/4 x 61 in.	14.70¢
3/4 x 61 1/2 in.	14.80¢
3/4 x 62 in.	14.90¢
3/4 x 62 1/2 in.	15.00¢
3/4 x 63 in.	15.10¢
3/4 x 63 1/2 in.	15.20¢
3/4 x 64 in.	15.30¢
3/4 x 64 1/2 in.	15.40¢
3/4 x 65 in.	15.50¢
3/4 x 65 1/2 in.	15.60¢
3/4 x 66 in.	15.70¢
3/4 x 66 1/2 in.	15.80¢
3/4 x 67 in.	15.90¢
3/4 x 67 1/2 in.	16.00¢
3/4 x 68 in.	16.10¢
3/4 x 68 1/2 in.	16.20¢
3/4 x 69 in.	16.30¢
3/4 x 69 1/2 in.	16.40¢
3/4 x 70 in.	16.50¢
3/4 x 70 1/2 in.	16.60¢
3/4 x 71 in.	16.70¢
3/4 x 71 1/2 in.	16.80¢
3/4 x 72 in.	16.90¢
3/4 x 72 1/2 in.	17.00¢
3/4 x 73 in.	17.10¢
3/4 x 73 1/2 in.	17.20¢
3/4 x 74 in.	17.30¢
3/4 x 74 1/2 in.	17.40¢
3/4 x 75 in.	17.50¢
3/4 x 75 1/2 in.	17.60¢
3/4 x 76 in.	17.70¢
3/4 x 76 1/2 in.	17.80¢
3/4 x 77 in.	17.90¢
3/4 x 77 1/2 in.	18.00¢
3/4 x 78 in.	18.10¢
3/4 x 78 1/2 in.	18.20¢
3/4 x 79 in.	18.30¢
3/4 x 79 1/2 in.	18.40¢
3/4 x 80 in.	18.50¢
3/4 x 80 1/2 in.	18.60¢
3/4 x 81 in.	18.70¢
3/4 x 81 1/2 in.	18.80¢
3/4 x 82 in.	18.90¢
3/4 x 82 1/2 in.	19.00¢
3/4 x 83 in.	19.10¢
3/4 x 83 1/2 in.	19.20¢
3/4 x 84 in.	19.30¢
3/4 x 84 1/2 in.	19.40¢
3/4 x 85 in.	19.50¢
3/4 x 85 1/2 in.	19.60¢
3/4 x 86 in.	19.70¢
3/4 x 86 1/2 in.	19.80¢
3/4 x 87 in.	19.90¢
3/4 x 87 1/2 in.	20.00¢
3/4 x 88 in.	20.10¢
3/4 x 88 1/2 in.	20.20¢
3/4 x 89 in.	20.30¢
3/4 x 89 1/2 in.	20.40¢
3/4 x 90 in.	20.50¢
3/4 x 90 1/2 in.	20.60¢
3/4 x 91 in.	20.70¢
3/4 x 91 1/2 in.	20.80¢
3/4 x 92 in.	20.90¢
3/4 x 92 1/2 in.	21.00¢
3/4 x 93 in.	21.10¢
3/4 x 93 1/2 in.	21.20¢
3/4 x 94 in.	21.30¢
3/4 x 94 1/2 in.	21.40¢
3/4 x 95 in.	21.50¢
3/4 x 95 1/2 in.	21.60¢
3/4 x 96 in.	21.70¢
3/4 x 96 1/2 in.	21.80¢
3/4 x 97 in.	21.90¢
3/4 x 97 1/2 in.	22.00¢
3/4 x 98 in.	22.10¢
3/4 x 98 1/2 in.	22.20¢
3/4 x 99 in.	22.30¢
3/4 x 99 1/2 in.	22.40¢
3/4 x 100 in.	22.50¢
3/4 x 100 1/2 in.	22.60¢
3/4 x 101 in.	22.70¢
3/4 x 101 1/2 in.	22.80¢
3/4 x 102 in.	22.90¢
3/4 x 102 1/2 in.	23.00¢
3/4 x 103 in.	23.10¢
3/4 x 103 1/2 in.	23.20¢
3/4 x 104 in.	23.30¢
3/4 x 104 1/2 in.	23.40¢
3/4 x 105 in.	23.50¢
3/4 x 105 1/2 in.	23.60¢
3/4 x 106 in.	23.70¢
3/4 x 106 1/2 in.	23.80¢
3/4 x 107 in.	23.90¢
3/4 x 107 1/2 in.	24.00¢
3/4 x 108 in.	24.10¢
3/4 x 108 1/2 in.	24.20¢
3/4 x 109 in.	24.30¢
3/4 x 109 1/2 in.	24.40¢
3/4 x 110 in.	24.50¢
3/4 x 110 1/2 in.	24.60¢
3/4 x 111 in.	24.70¢
3/4 x 111 1/2 in.	24.80¢
3/4 x 112 in.	24.90¢
3/4 x 112 1/2 in.	25.00¢
3/4 x 113 in.	25.10¢
3/4 x 113 1/2 in.	25.20¢
3/4 x 114 in.	25.30¢
3/4 x 114 1/2 in.	25.40¢
3/4 x 115 in.	25.50¢
3/4 x 115 1/2 in.	25.60¢
3/4 x 116 in.	25.70¢
3/4 x 116 1/2 in.	25.80¢
3/4 x 117 in.	25.90¢
3/4 x 117 1/2 in.	26.00¢
3/4 x 118 in.	26.10¢
3/4 x 118 1/2 in.	26.20¢
3/4 x 119 in.	26.30¢
3/4 x 119 1/2 in.	26.40¢
3/4 x 120 in.	26.50¢
3/4 x 120 1/2 in.	26.60¢
3/4 x 121 in.	26.70¢
3/4 x 121 1/2 in.	26.80¢
3/4 x 122 in.	26.90¢
3/4 x 122 1/2 in.	27.00¢
3/4 x 123 in.	27.10¢
3/4 x 123 1/2 in.	27.20¢
3/4 x 124 in.	27.30¢
3/4 x 124 1/2 in.	27.40¢
3/4 x 125 in.	27.50¢
3/4 x 125 1/2 in.	27.60¢
3/4 x 126 in.	27.70¢
3/4 x 126 1/2 in.	27.80¢
3/4 x 127 in.	27.90¢
3/4 x 127 1/2 in.	28.00¢
3/4 x 128 in.	28.10¢
3/4 x 128 1/2 in.	28.20¢
3/4 x 129 in.	28.30¢
3/4 x 129 1/2 in.	28.40¢
3/4 x 130 in.	28.50¢
3/4 x 130 1/2 in.	28.60¢
3/4 x 131 in.	28.70¢
3/4 x 131 1/2 in.	28.80¢
3/4 x 132 in.	28.90¢
3/4 x 132 1/2 in.	29.00¢
3/4 x 133 in.	29.10¢
3/4 x 133 1/2 in.	29.20¢
3/4 x 134 in.	29.30¢
3/4 x 134 1/2 in.	29.40¢
3/4 x 135 in.	29.50¢
3/4 x 135 1/2 in.	29.60¢
3/4 x 136 in.	29.70¢
3/4 x 136 1/2 in.	29.80¢
3/4 x 137 in.	29.90¢
3/4 x 137 1/2 in.	30.00¢
3/4 x 138 in.	30.10¢
3/4 x 138 1/2 in.	30.20¢
3/4 x 139 in.	30.30¢
3/4 x 139 1/2 in.	30.40¢
3/4 x 140 in.	30.50¢
3/4 x 140 1/2 in.	30.60¢
3/4 x 141 in.	30.70¢
3/4 x 141 1/2 in.	30.80¢
3/4 x 142 in.	30.90¢
3/4 x 142 1/2 in.	31.00¢
3/4 x 143 in.	31.10¢
3/4 x 143 1/2 in.	31.20¢
3/4 x 144 in.	31.30¢
3/4 x 144 1/2 in.	31.40¢
3/4 x 145 in.	31.50¢
3/4 x 145 1/2 in.	31.60¢
3/4 x 146 in.	31.70¢
3/4 x 146 1/2 in.	31.80¢
3/4 x 147 in.	31.90¢
3/4 x 147 1/2 in.	32.00¢
3/4 x 148 in.	32.10¢
3/4 x 148 1/2 in.	32.20¢
3/4 x 149 in.	32.30¢
3/4 x 149 1/2 in.	32.40¢
3/4 x 150 in.	32.50¢
3/4 x 150 1/2 in.	32.60¢
3/4 x 151 in.	32.70¢
3/4 x 151 1/2 in.	32.80¢
3/4 x 152 in.	32.90¢
3/4 x 152 1/2 in.	33.00¢
3/4 x 153 in.	33.10¢
3/4 x 153 1/2 in.	33.20¢
3/4 x 154 in.	33.30¢
3/4 x 154 1/2 in.	33.40¢
3/4 x 155 in.	33.50¢
3/4 x 155 1/2 in.	33.60¢
3/4 x 156 in.	33.70¢
3/4 x 156 1/2 in.	33.80¢
3/4 x 157 in.	33.90¢
3/4 x 157 1/2 in.	34.00¢
3/4 x 158 in.	34.10¢
3/4 x 158 1/2 in.	34.20¢
3/4 x 159 in.	34.30¢
3/4 x 159 1/2 in.	34.40¢
3/4 x 160 in.	34.50¢
3/4 x 160 1/2 in.	34.60¢
3/4 x 161 in.	34.70¢
3/4 x 161 1/2 in.	34.80¢
3/4 x 162 in.	34.90¢
3/4 x 162 1/2 in.	35.00¢
3/4 x 163 in.	35.10¢
3/4 x 163 1/2 in.	35.20¢
3/4 x 164 in.	35.30¢
3/4 x 164 1/2 in.	35.40¢
3/4 x 165 in.	35.50¢
3/4 x 165 1/2 in.	35.60¢
3/4 x 166 in.	35.70¢
3/4 x 166 1/2 in.	35.80¢
3/4 x 167 in.	35.90¢
3/4 x 167 1/2 in.	36.00¢
3/4 x 168 in.	36.10¢
3/4 x 168 1/2 in.	36.20¢
3/4 x 169 in.	36.30¢
3/4 x 169 1/2 in.	36.40¢
3/4 x 170 in.	36.50¢
3/4 x 170 1/2 in.	36.60¢
3/4 x 171 in.	